GENERAL MIDI INSTRUMENT

SOUNDENGINE™ MUSIC MODULE

Operations Manual

E-MU

SoundEngine Music Module
Operation Manual
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■ FI 412 Rev. A

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Important Notice: In order to obtain warranty service on your SoundEngine Music Module, the serial number sticker on the unit must be intact, and you must have a sales receipt or other proof of purchase. If there is no serial number sticker on your Music Module, please contact E-mu Systems at once.

Please read the following information before operating your SoundEngine Music Module.

Safety Information

- The Music Module should only be connected to a power supply of the type described in the operating instructions or as marked on the product.
- Make sure that the power cord for the Music Module's AC adaptor is not located where it may be walked on, crushed or pinched.
- Before connecting the AC adapter to the Music Module, make sure it is disconnected from the wall outlet (mains). Always connect the AC adapter to the Music Module ***First***, then plug the adapter into the wall outlet.
- Do not operate the Music Module near water.
- This product, either alone or in conjunction with and amplifier, headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable.
- This product should be located away from heat sources such as radiators, heat registers or other products that produce heat.
- This product may be equipped with a polarized line plug (one blade wider than the other). This is a safety feature. If you are unable to insert this plug into an oulet, contact an electrician to replace your obsolete outlet. Do not defeat the safety purpose of this plug.

Important Safety Instructions

- The Music Module may generate radio frequency energy which could possibly affect TV and radio reception. If this is the case, simply move the Music Module to another location.
- The Music Module should be serviced by qualified personnel when:
  - A. The AC Adapter, cord or plug has been damaged; or
  - B. Objects have fallen into, or liquids have spilled into the product; or
  - C. The product has been exposed to rain; or
  - D. The product does not appear to operate normally or exhibits a marked change in performance; or
  - E. The product has been dropped or the enclosure damaged.
- The Music Module contains no user servicable parts. All servicing should be referred to qualified personnel.

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INTRODUCTION

Thank you for purchasing the SoundEngine Music Module. The Music Module integrates 16-bit, digitally sampled sounds with easy to use sound programming features and a MIDI interface in one package.

Features

- 16-bit quality sampled sounds. Sampling is the process of digitally recording sounds and playing them back. E-mu's state-of-the-art digital sampling gives you all the vibrancy of real musical instruments.

- 128 General MIDI sound presets and 64 different drum sets will improve the sound of any General MIDI sequence.

- On-board digital sound effects. Reverb and Chorus give your music and MIDI sequences a professional touch.

- 16-channel MIDI capability lets you assign up to 16 different instruments, on separate tracks, to play together like a real orchestra.

- 32 note polyphony lets you play even the most advanced music scores or song sequences.

- Includes easy to use, professional-grade sequencing and sound editing programs.

- Built-in MIDI interface and computer printer thru port so you don't have to switch cables when you want to use your printer.

BASIC OPERATION

Overview of the Music Module

The Music Module combines E-mu's powerful SoundEngine sample playback technology, MIDI Interface and professional sequencing/sound editing software.

The **Sound Engine**portion of the module can produce up to 32 different sounds simultaneously. There are 128 different sounds, called *Presets*, as well as 64 drum kits. All the sounds are generated using a process called *Sampling*, which works somewhat like a tape recorder in that "real" instruments are recorded and then played back at different pitches. Because of this technique, the Music Module sounds are incredibly realistic.

The **MIDI Interface** portion of the Music Module turns your computer into a powerful music composition and sound creation laboratory. MIDI is a universal standard interface for controlling musical equipment. There are literally thousands of programs and devices available which use this powerful interface standard.

The Music Module can be used with a MIDI sequencer or as a stand alone sound module. Or, it can simply be used as MIDI interface to control any MIDI instrument(s). To use the Music Module, you will need either a **Macintosh computer (2 MB RAM ,software version 6.0 or higher) , a MIDI keyboard, or both.**

MIDI Channels

The Music Module can receive on up to 16 MIDI channels simultaneously. A MIDI channel is rather like a channel on your TV set. If you tune in to one channel, you will not receive the other channels. The Music Module is a like a TV with 16 screens! You can tune-in and listen to up to 16 different musical lines at once, selecting a different preset *(sound)* for each.

General MIDI Sounds

The presets (or complete sounds) in the Music Module conform to the General MIDI specification. General MIDI is basically a

minimum set of features for an instrument and a standard organization of the sound locations so that sequences written on one instrument will play back correctly on another instrument. For example, General MIDI says that preset number 1 will always be an acoustic grand piano and that preset 7 will be a harpsichord. All of the 128 General MIDI presets have been arranged in a standard order. *See - About MIDI on page 45.*

Drum Kits

In addition to the 128 presets, General MIDI defines one drum preset which contains 61 drum and percussion sounds mapped across the keys of the keyboard. The Music Module goes quite a bit further by allowing you to select any one of 64 different drum kits. Drum kits are always placed on MIDI channel 10, as defined by the General MIDI standard. Drums are always given top priority when playing back a sequence.

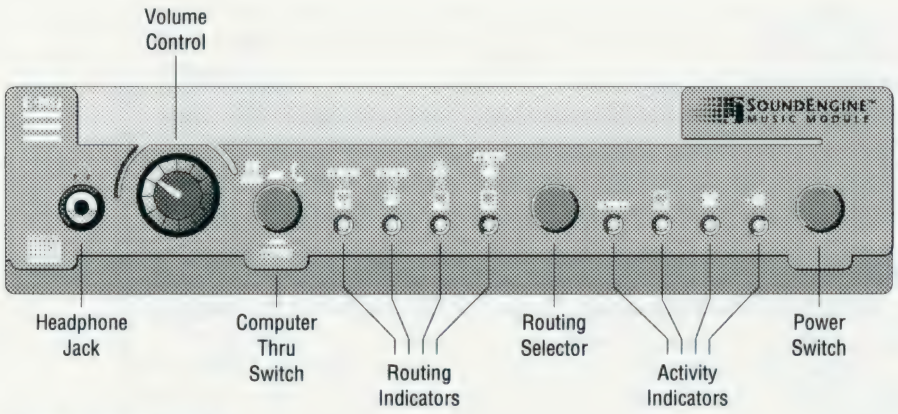
Digital Reverb & Chorus

The Music Module contains a built-in digital effects processor which is used to add warmth and depth to the sound. Reverb is used to simulate the sound of a room such as a large auditorium or church. Chorus simulates the sound of many instruments (hence the name) and is used to make the sound thicker. In addition to reverb and chorus, the Music Module contains several other effects, such as digital delay (for echoes and doubling), and a flanger and phase shifter (for effects).

Sound Editing

The included Editor/Librarian program allows you to control the global functions of the Music Module and edit effects in a limited way. If you want full-featured sound editing for designing your own custom sounds, a software upgrade to the Edit One program is available which provides access to a broader menu of programming.

Front Panel



Headphone Jack
Accepts standard "Mini-phone" type stereo headphones from 8 to 150 ohms.

Volume Control
Adjusts the volume of the line outputs and the headphone output.

Computer Thru Switch
Allows you to switch between the Module or your Printer (Modem).

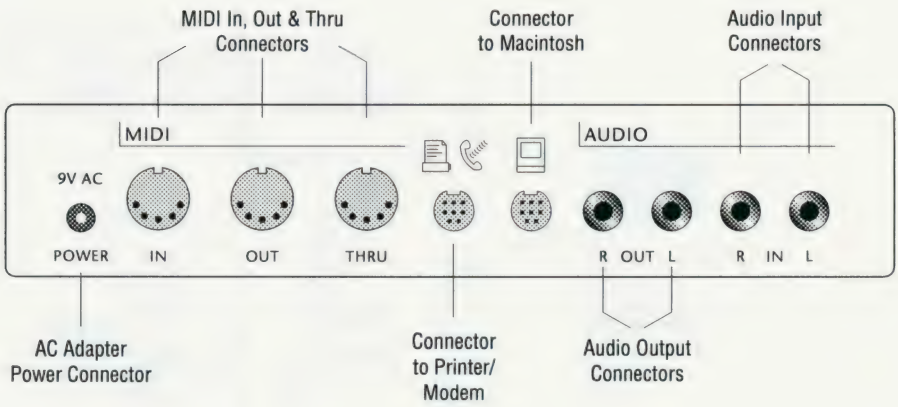
Routing Indicators
Indicate the current Music Module routing mode. See page 9 for additional information.

Routing Selector
Selects one of the four Music Module routing modes.

Activity Indicators
Light to show that the Module is sending or receiving data. The rightmost red LED shows that the unit is turned on.

Power Switch
Turns the SoundEngine Music Module On and Off.

Rear Panel



Power Connector
Connects to the AC wall adapter and supplies power to the Music Module.

MIDI Connectors
MIDI In.....Receives data from any MIDI instrument (such as a keyboard).
MIDI Out ....Transmits data from the Module or computer to other devices.
MIDI Thru ..Sends out a copy of the MIDI data received at the MIDI In port.

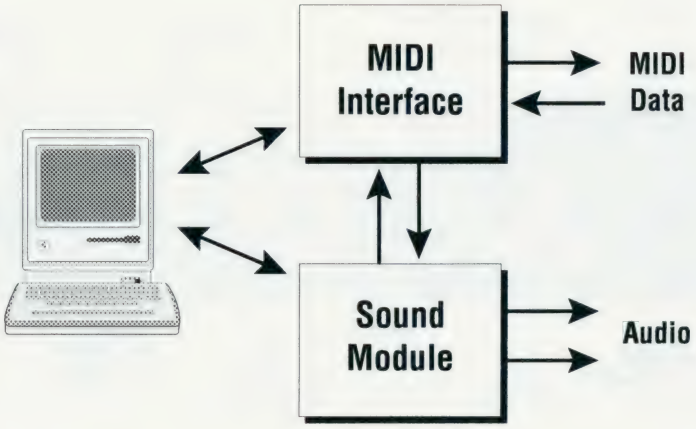
Printer/Modem Connector
Connects to your Printer or Modem.

Computer Connector
Connects to the Printer or Modem port of your computer.

Audio Input Connectors
Allow you to mix another stereo audio signal (such as another instrument or a CD player) in with the Music Module audio outputs.

Audio Output Connectors
Connect to your stereo sound system. The audio outs are standard line level (-10 dBV) signals

Basic Operation



The SoundEngine Music Module is really two devices in one.

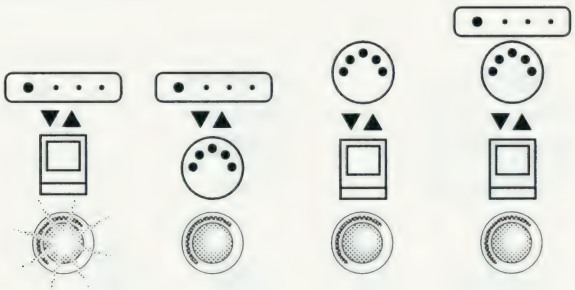
- A high-quality, 16-bit sound module.
- A computer MIDI interface.

As shown in the diagram above, the computer can communicate with the Sound Module, the MIDI interface or both at once.

The Computer Thru switch on the front panel allows you to have the SoundEngine Music Module and your printer (or modem) connected at the same time and switch between them.

Routing Modes

The SoundEngine Music Module has four different routing modes which define the way it will be used.

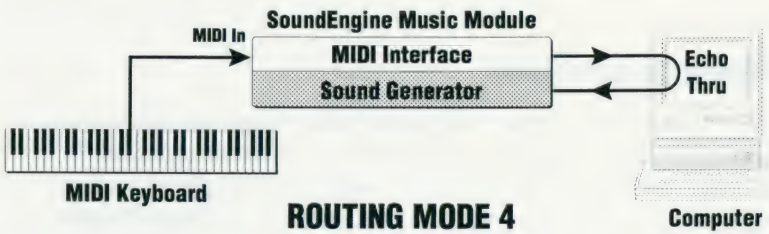


Routing Mode 1 - Computer Controlled Sound Module

Routing Mode 2 - MIDI Controlled Sound Module

Routing Mode 3 - MIDI Interface

Routing Mode 4 - Sound Module and MIDI Interface

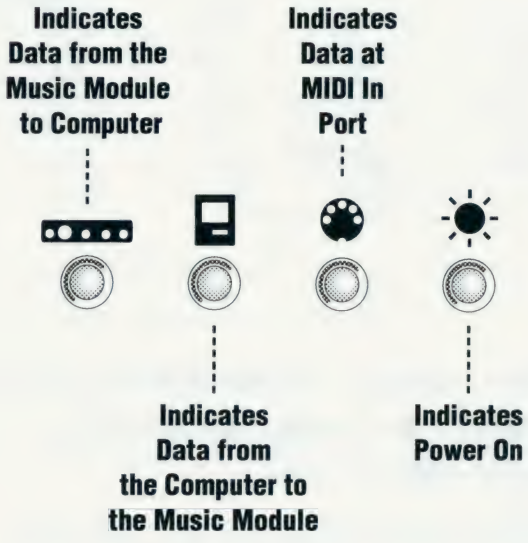


ROUTING MODE 4

Routing Mode 4 requires that you are running a MIDI software program which has Keyboard Thru mode enabled.

Activity Indicators

The Music Module has four Activity Indicators which show data flowing in and out of the Music Module. These indicators are very useful in diagnosing problems with the MIDI system.


Indicates Data from the Music Module to Computer
Indicates Data at MIDI In Port
Indicates Data from the Computer to the Music Module
Indicates Power On

Missed Data Indicator

The Power On indicator will flash if data is missed while transferring data between the Music Module and the computer in routing mode four. Missed data could occur by playing your MIDI keyboard while a SysEx transfer from the SoundEngine Music Module to the computer is taking place. Therefore playing the keyboard in mode four during SysEx transfers is NOT RECOMMENDED.

Routing Mode 1 Computer Controlling the Music Module

In this mode, the Music Module is used as a computer controlled sound source without using a MIDI keyboard.

Connect the Music Module as shown in the diagram on the facing page. Any stereo system that has Line Level inputs may be used. For Mono operation, connect only one side (L or R).

Connections

Before making any connections, turn all the equipment Off.

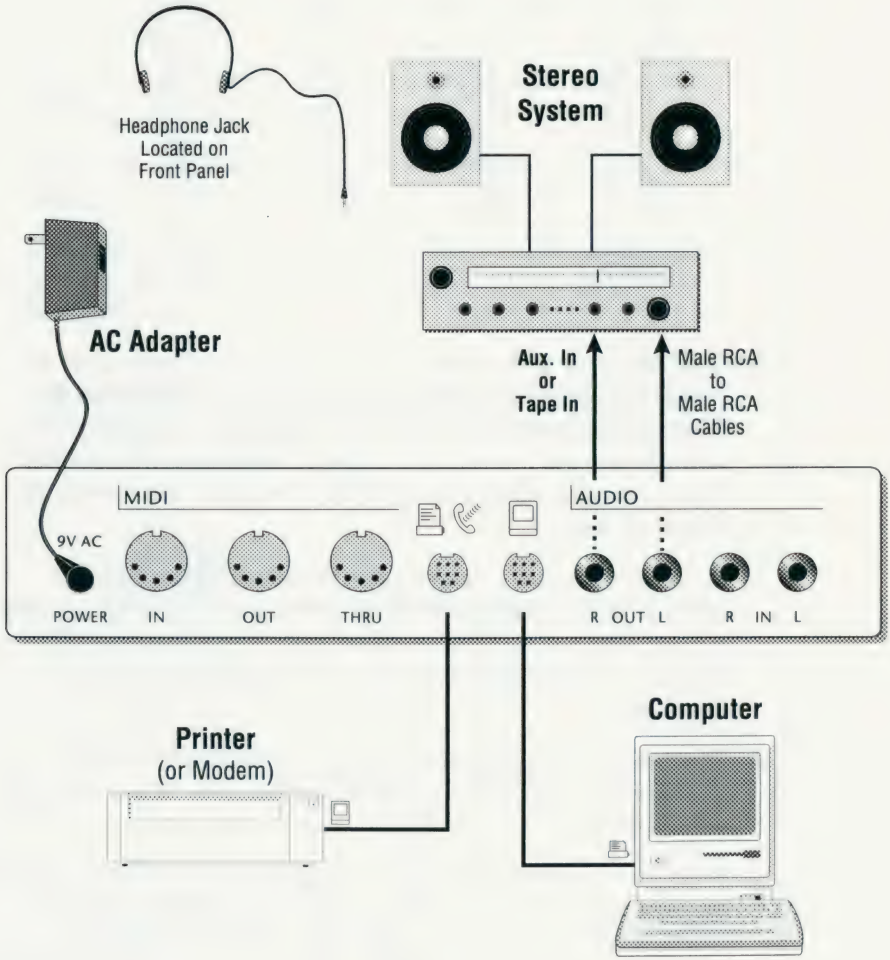
1. Connect the Macintosh connector on the Music Module to either the Printer or Modem port on your computer. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack on the Music Module. This great feature allows you to leave everything connected and use the Thru switch to select the device.
2. Connect the Audio Out from the Music Module to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
3. Connect the AC Adapter to the power connector on the rear of the Music Module, then plug it into the wall outlet. ***Always connect the AC Adapter to the Music Module first, then into the wall!***

Power Up!

1. Turn on the power using the front panel switch. The green power LED should light.
2. Switch on the power to your computer.
3. Turn the volume control on your stereo system to minimum, then switch its power on.

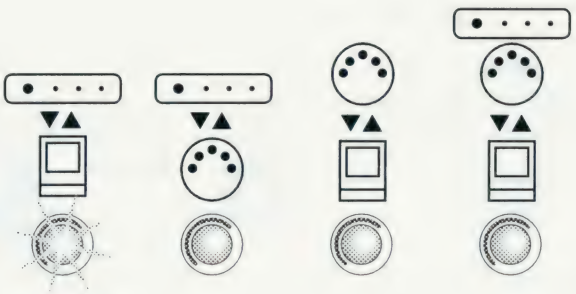
Routing Mode 1

Music Module-Computer Connection Diagram



Note: Only the computer interface cable is included.

Routing Mode 1 Computer Controlling the Music Module



Mode 1

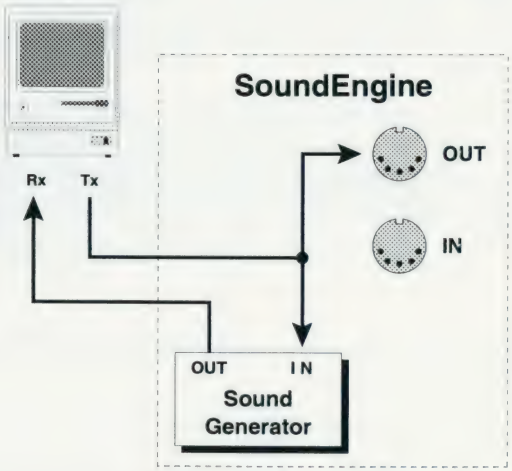
Operation

1. Press the routing mode selector button repeatedly until the Mode 1 LED is lit, as shown in the diagram above. (Music Module powers up in Mode 1.) In this mode incoming MIDI messages will be ignored. Only the computer will control the Music Module.
2. Press the Computer Thru button IN to connect the Music Module to the computer. (With the button OUT, the computer is connected to your Printer or Modem.) If the routing LED is flashing, it means that the Computer Thru button is not depressed.
3. Open one of the demo sequences from the *EZ* Vision sequencer program. Refer to the sequencer manual provided for details on sequencer operation.
4. With the sequence playing, slowly turn up the volume control on your stereo system until a comfortable listening level is reached. The Computer Activity LED should be flashing.

Routing Mode 1 Computer Controlling the Music Module

▼ **NO SOUND? Check the following:**

- Is the serial cable connected between the computer and the Music Module?
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Make sure the Routing Selector on the Music Module is set to Mode 1.
- Check your stereo system routing switch and volume control. You can also check the Music Module output using stereo headphones.
- If the Computer Activity LED is not flashing, make sure the sequencer software is set to transmit on the same serial port that you have connected to the Music Module. (Check MIDI Setup in the sequencer manual.)



Routing Diagram for Mode 1

In this mode, the Music Module is played directly from a MIDI keyboard without the need for a computer. Any keyboard which has a MIDI Out jack can be used.

Connect the Music Module as shown in the diagram on the facing page. Any stereo system that has Line Level inputs may be used. For Mono operation, connect only one side (L or R).

Connections

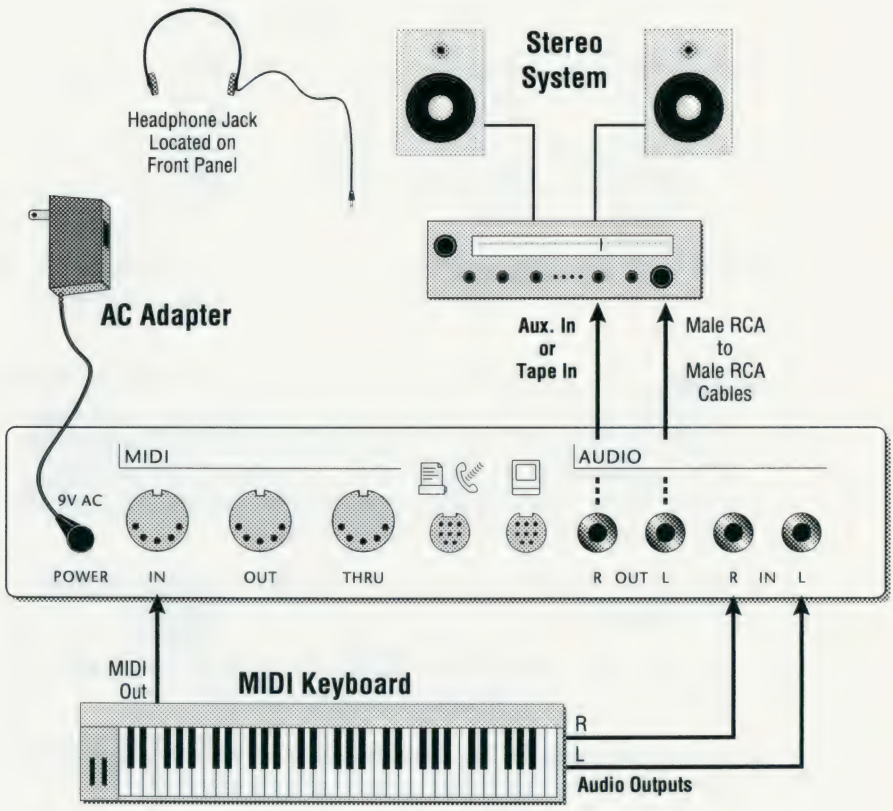
Before making any connections, turn all the equipment Off.

1. Connect the MIDI Out from your MIDI keyboard to the MIDI In on the Music Module.
2. The audio outputs of your MIDI keyboard (if any) can be connected to the Audio Inputs of the Music Module so that both the MIDI keyboard and the Music Module can be heard.
3. Connect the Audio Outputs from the Music Module to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
4. Connect the AC Adapter to the Power connector on the rear of the Music Module, then plug it into the wall outlet. ***Always connect the AC Adapter to the Music Module first, then into the wall!***

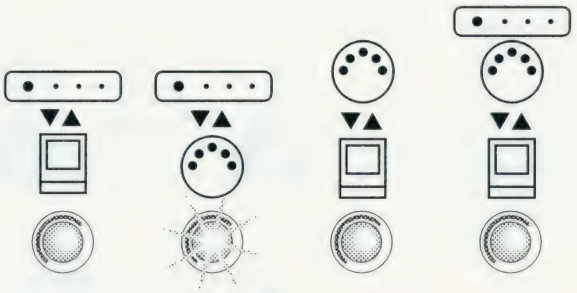
Power Up!

1. Turn on the power using the front panel switch. The green power LED should light.
2. Switch on the power to your MIDI keyboard.
3. Turn the volume control on your stereo system to minimum, then switch its power on.

Routing Mode 2
Connecting the Music Module to a MIDI Keyboard



Note: Cables are not included.



Mode 2

Operation

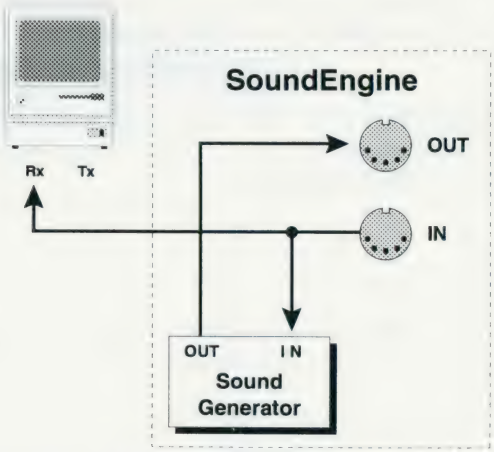
1. Press the Routing Mode Selector button repeatedly until the Mode 2 LED is lit, as shown in the diagram above. In this mode the computer is disconnected from the system. Only the MIDI port will control the Music Module.
2. Play your MIDI keyboard and verify that the MIDI Activity LED flashes.
3. Slowly turn up the volume control on your stereo system until a comfortable listening level is reached.
4. You should now be hearing the Music Module and possibly your MIDI keyboard if its outputs are connected.
5. Change the preset (program) on your MIDI keyboard. The Music Module's preset should change as well.
6. Changing a preset on your MIDI keyboard will select one of the Music Module's 128 presets. For a complete listing of all the Music Module presets, see pages 66 and 67 in this manual.

▼ **NO SOUND? Check the following:**

- Is the MIDI cable connected between your MIDI keyboard MIDI Out and the Music Module MIDI In?
- Make sure the Routing Selector on the Music Module is set to Mode 2.
- Check your stereo system routing switch and volume control. You can also check the Music Module output using stereo headphones.
- If the MIDI activity LED is not flashing, make sure your MIDI keyboard is set up to transmit MIDI data.

▼ **NO PRESET CHANGE? Check the following:**

- Each time you change a preset on your MIDI keyboard, the MIDI activity LED should blink once. If not, check the MIDI cable again and make sure your MIDI keyboard is programmed to transmit program changes.



Routing Diagram for Mode 2

In this mode, the Music Module is used as a MIDI interface to the computer. The sound generator portion of the Music Module responds to MIDI data from the computer as if it was just another MIDI sound module.

Connect the SoundEngine Music Module as shown in the diagram on the facing page.

Connections

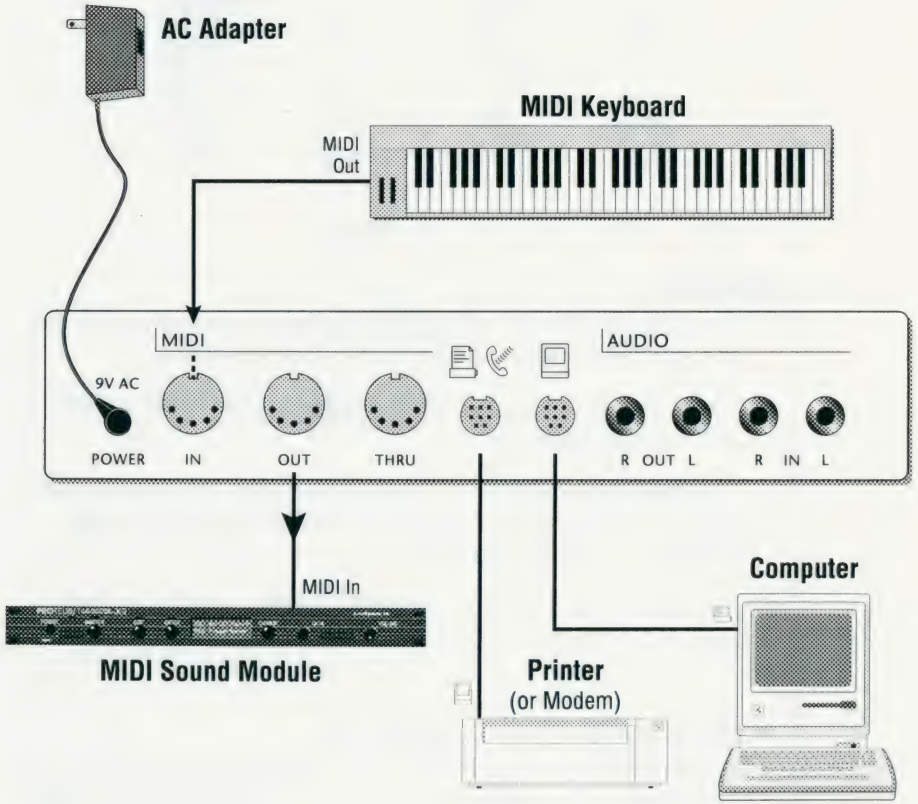
Before making any connections, turn all the equipment Off.

1. Connect the computer connector on the Music Module to either the Printer or Modem port on your computer. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack (Computer Thru) on the Music Module.
2. Connect the AC Adapter to the power connector on the rear of the Music Module, then plug it into the wall outlet. ***Always connect the AC Adapter to the Music Module first, then into the wall!***
3. Connect MIDI Out of your MIDI keyboard to MIDI In of the Music Module. Connect MIDI Out of the Music Module to MIDI In of your MIDI keyboard.

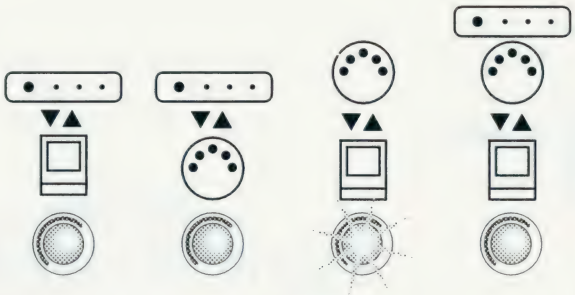
Power Up!

1. Turn on power to the Music Module using the front panel switch. The green power LED should light.
2. Switch on the power to your computer.
3. Switch on the power to your MIDI keyboard and Sound Module (if connected).

Routing Mode 3
Connecting the Music Module as a MIDI Interface



Note: Only the computer interface cable is included.



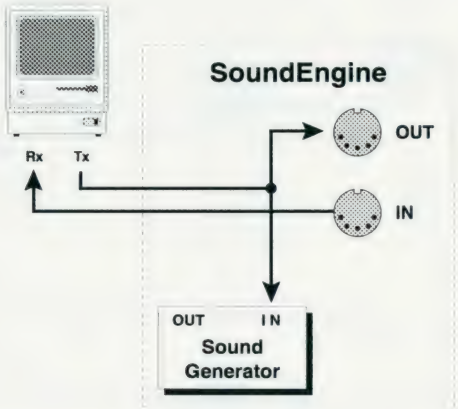
Mode 3

Operation

1. Press the Routing Mode Selector button repeatedly until the Mode 2 LED is lit, as shown in the diagram above.
2. Play a few keys on your MIDI keyboard. The MIDI activity LED should flash.
3. You may now use the *EZ* Vision sequencer, Edit One or other MIDI program on the computer. The Music Module will function as a MIDI interface.
4. Using Keyboard Thru mode on *EZ* Vision, a MIDI keyboard can control the Music Module's internal sound generator.

▼ **PROBLEMS? Check the following:**

- Is the MIDI Activity LED flashing when you play keys on the keyboard? If not, check the MIDI cable connection and make sure your keyboard is programmed to transmit MIDI data.
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Check the MIDI setup in whatever program you are running. The selected serial port on the MIDI Setup should match the port connected to the Music Module.



Routing Diagram for Mode 3

Routing Mode 4 — *Sound Module & MIDI Interface*

In this mode, the Music Module is used both as a computer MIDI interface and a sound module at the same time.

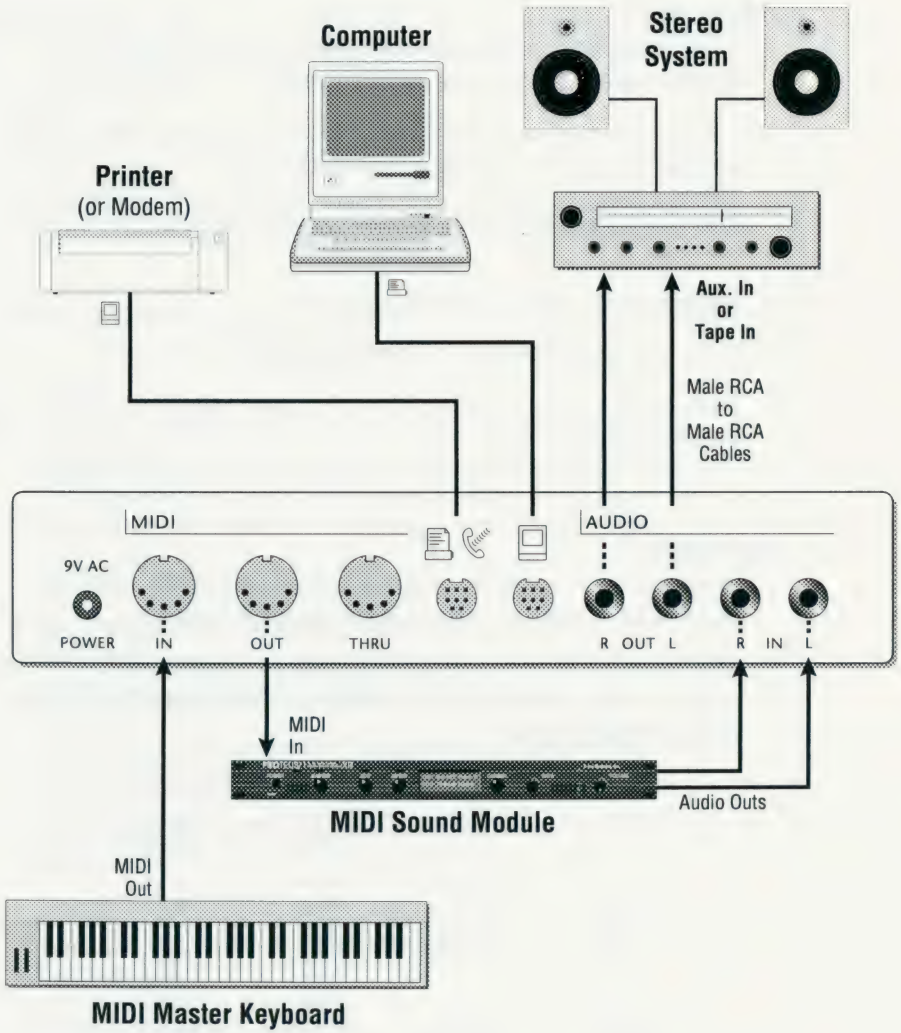
Connect the Music Module as shown in the diagram on the facing page. Any stereo system that has Auxiliary or Tape inputs may be used. For Mono operation, connect only one side (L or R).

Connections

1. Connect the MIDI Out from your MIDI keyboard to the MIDI In on the Music Module.
2. Connect the MIDI Out from the Music Module to the MIDI In on your other MIDI sound module(s).
3. Connect the computer connector on the Music Module to either the Printer or Modem port on your computer. Use the Mini Din-8 cable supplied. (The Modem port is most often used for music applications.) If you have a printer or modem, connect it to the other Mini Din jack (Computer Thru) on the Music Module.
4. The audio outputs of your MIDI keyboard (or MIDI sound module) can be connected to the Audio Inputs of the Music Module so that both the MIDI keyboard and the Music Module can be heard.
5. Connect the Audio Out from the Music Module to the inputs (Aux. or Tape) of your stereo amplifier. If you are using stereo headphones, connect them to the front panel headphone jack.
6. Connect the AC Adapter to the Power connector on the rear of the Music Module, then plug it into the wall outlet. ***Always connect the AC Adapter to the Music Module first, then into the wall!***

Routing Mode 4

Sound Module & MIDI Interface Connection



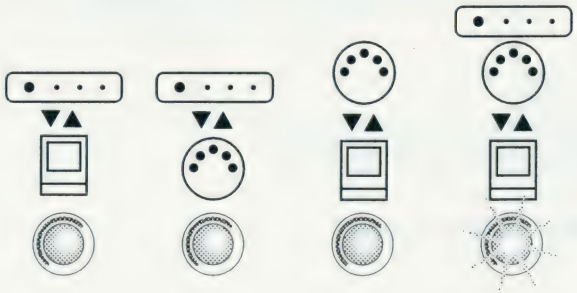
Note: Only the computer interface cable is included.

Power Up!

1. Turn down the volume control on the Music Module, your MIDI keyboard, and your sound system.
2. Turn on the power to the Music Module using the front panel switch. The green power LED should light.
3. Switch on the power to your MIDI keyboard and sound module.
4. Switch on the power to your computer.
5. Switch on the power to your stereo system.
6. Turn up the volume on the Music Module and your MIDI sound module.

Operation

1. Press the Routing Mode Selector button repeatedly until the Mode 4 LED is lit, as shown in the diagram below.
2. Play a few notes on your MIDI keyboard. The MIDI In activity LED should flash indicating that the Music Module is receiving MIDI data.



Mode 4

3. Open *EZ* Vision or another sequencer program. Make sure that the proper serial port on the computer is selected and that Keyboard Thru mode is On.

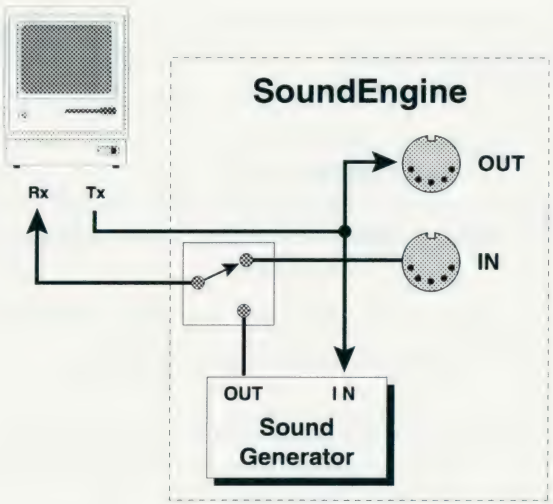
IMPORTANT
The Music Module will NOT play in Mode 4 until a MIDI sequencer or other program is running with Keyboard Thru mode On.

(Note: Keyboard Thru mode is also called Echo Thru, Echo Keyboard or MIDI Thru on other MIDI applications.)

4. Play your MIDI keyboard while slowly turning up the volume on your stereo system. Both the Computer Activity and the MIDI Activity LEDs should flash when you play keys. You should also be hearing sound at this point.

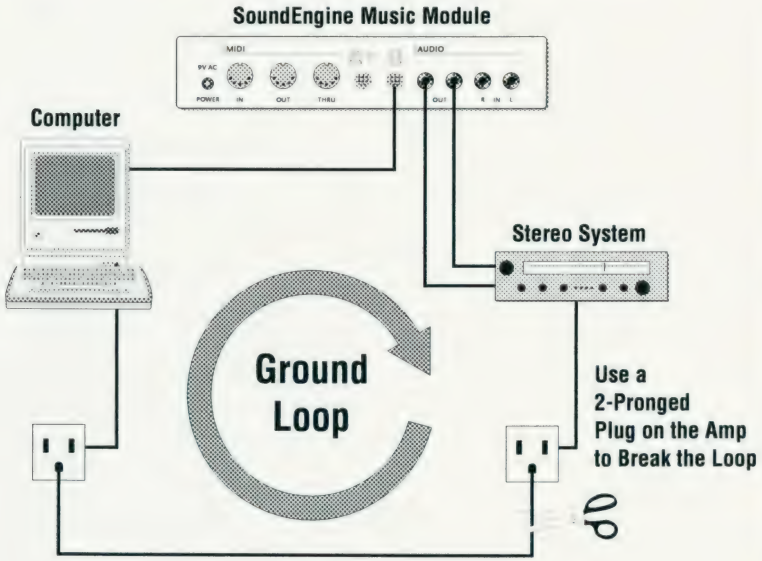
▼ **NO SOUND? Check the following:**

- Is the MIDI cable connected between your MIDI keyboard MIDI Out and the Music Module MIDI In?
- Make sure the Computer Thru switch is depressed (The routing LEDs should not be flashing).
- Make sure the Routing Selector on the Music Module is set to Mode 4.
- Check your stereo system routing switch and volume control. You can also check the Music Module output using stereo headphones.
- If the MIDI Activity and the Computer Activity LEDs are not BOTH flashing when you play keys, turn on **Keyboard Thru** mode in the Setup menu of your sequencer.



Routing Diagram for Mode 4.
The computer can receive data from either the MIDI In port or the Sound Generator through the use of an automatic switch.

When multiple pieces of audio gear are connected together there is the possiblity that a ground loop can occur in the system. Ground loops occur when each piece of the audio system has its own path to ground. Since the ground of each different piece of equipment is at a slightly different potential, current flows around the loop, causing a hum. When a computer is added to an audio system the problem may be compounded, as most computers are not designed to be part of a music system.



Using a power amplifier or stereo system which has a two-pronged power plug eliminates the problem, since the ground loop is now broken at this point. If your system is producing audio hum, analyze the system for the presence of a ground loop. This is most likely to be causing the hum.

OPERATIONS

Basic Definitions

Preset
A preset is a instrument sound such as a Grand Piano, Electric Guitar or a Violin. Presets are sometimes called Programs in other equipment.

MIDI Program Change
Presets (or programs) can be changed via MIDI command. MIDI can select up to 128 different presets. On the SoundEngine Music Module presets can only be changed by MIDI command.

MIDI Channel
MIDI contains 16 separate channels each of which can control a different preset or sound in the Music Module. Each MIDI channel also has its own set of controllers such as Volume, Pitch Bend and Pan Position which will only affect that channel.

Drum Kits
The Music Module contains a number of drum kits (128 total) which can ONLY be accessed using MIDI channel 10 (The percussion channel).

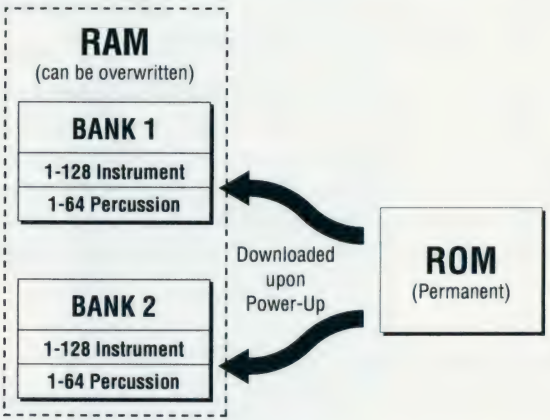
Effects
Effects such as reverberation and echo, are applied to selected presets of the Music Module in order to add spacial complexity to the sound or for special effects. The Music Module has two effect processors for the entire machine.

Polyphony
Polyphony describes the maximum number of notes an instrument can play simultaneously. The Music Module is 32 note polyphonic.

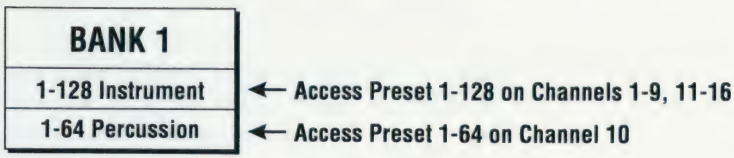
Preset Banks

The Music Module contains two banks of 128 General MIDI compatible presets and 64 percussion presets. Upon power-up both preset banks are automatically downloaded into RAM from permanent ROM. These RAM banks can be overwritten with other preset sounds using the sound editor computer software.

The Music Module normally uses Bank 1. Bank 2 can be switched in using the editor program or by MIDI SysEx command. Only one of the banks can be accessed at a time.



The two banks consist of 128 instrument presets and 64 percussion presets. Percussion presets can only be accessed on MIDI channel 10 by selecting preset numbers from 0-63. Selecting a percussion preset higher than 63 will not have any effect. All of the other channels can select instrument presets 0-127.



Selecting Presets on the Music Module

Selecting Instrument Presets

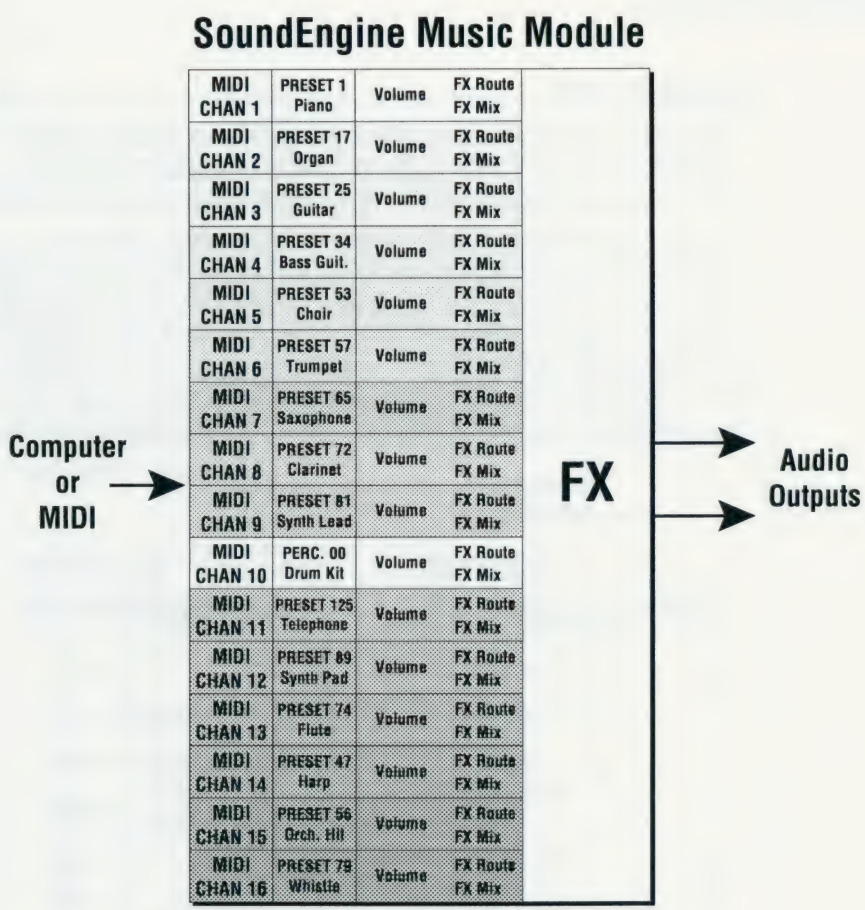
If you are using a MIDI keyboard which has preset selection buttons, simply select the program from the front panel of you keyboard and the Music Module preset of the same number will be selected as well. If your MIDI keyboard cannot select presets up to 128, the editor program can be used to select any available preset.

▼ If your keyboard HAS preset selection facilities but the Music Module program does not change, it may be because MIDI preset selection has been turned Off on your MIDI keyboard. Refer to the operation manual of your MIDI keyboard to find out how to turn MIDI Program Change On.

▼ If you have a MIDI keyboard WITHOUT preset selection capabilities or if your MIDI keyboard cannot access all 128 preset programs, your computer can be used to change presets on the Music Module. Presets can be selected using either the Edit-One or *EZ* Vision programs supplied with the Music Module. Any sequencer program can perform MIDI preset (program) changes.

Selecting Percussion Presets

Percussion presets are selected just like an instrument preset on MIDI channel 10 ONLY. Channel 10 is the percussion channel. Channel 10 only reponds to presets 1-64. All other program change numbers will simply be ignored.

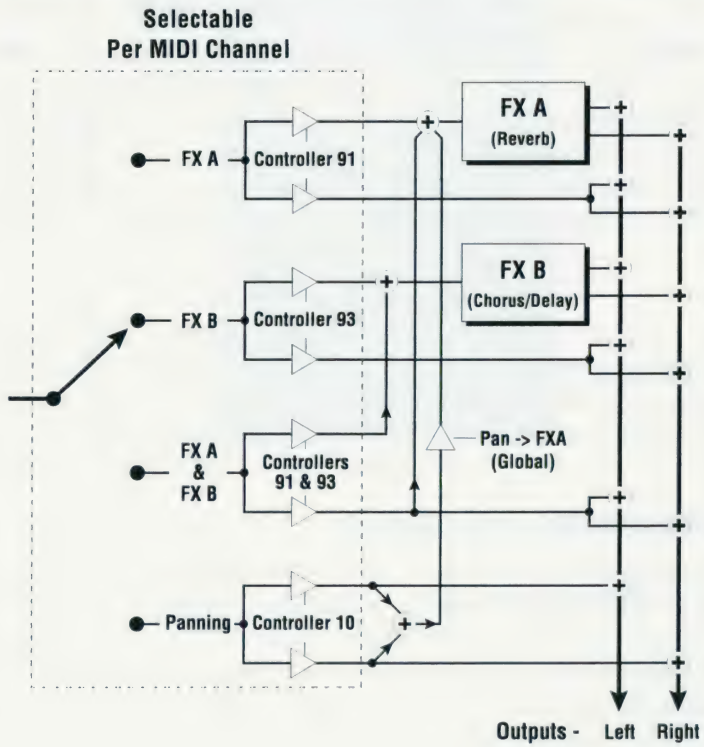


The SoundEngine Music Module

The SoundEngine Music Module is 16 part multi-timbral, meaning that each of the 16 MIDI channels can play a different sound (preset). Additionally, each preset has an associated Volume, Effects Routing and Effects Mix (how much effect). These parameters may be changed via your MIDI keyboard or sequencer program at any time via MIDI command allowing automated mixing and effect amounts.

Effects Routing

The Music Module contains two separate effects processors, FX A and FX B. The effect for each of the two processors is selected for the entire unit. For each MIDI channel, you can select one of the four effect busses and the amount of the effect. Selecting panning allows you to position the sound in the stereo field. An additional path, Pan -> FX A, allows a programmable amount of the panning signal to be sent through FX A so that you can have panning as well as effect. There is only one Pan -> FX A amount for the entire machine, therefore any MIDI channels using the Pan routing will have the same amount of reverb signal applied.



Effect bus selection and the type of effect is accomplished using the editor program or by SysEx command. The effects amounts or pan positions are controlled by sending a MIDI continuous controller value on the appropriate MIDI channel.

Both effect processors have a variety of different effects available. Effect A is normally used for reverb. Reverb is the sort of effect that sounds good with just about everything. Chorus and delays are useful for accents and special effects. Using the editor program you can select **one** A effect and **one** B effect for the entire Music Module. The effect routings and amounts are programmable for each MIDI channel using the editor program or your MIDI sequencer.

EFFECT A
Reverb/Delay Effects

- *Room*
- *Warm Room*
- *Small Room 1, 2*
- *Plate 1, 2, 3*
- *Chamber 1, 2*
- *Hall 1, 2, 3*
- *Early Reflection 1-4*
- *Rain*
- *Delay*
- *Cross Delay*
- *Echo*

EFFECT B
Chorus/Delay Effects

- *Stereo Chorus*
- *Stereo Flange*
- *Phaser*
- *Delay*
- *Cross Delay*

Types of Effects

Reverbs
Reverbs are basically room simulations of different types with various wall surfaces and furnishings. A plate is a type of mechanical reverb unit which sounds smooth and clean.

Early Reflections
These are simply the initial complex echoes from various rooms without the decay portion of the reverb.

Rain
A special effect which creates a flurry of rapid, multiple echoes.

Delay
A short echo effect useful to thicken a sound or for sound effects.

Cross Delay
A short echo effect in which the echoes criss-cross from side to side.

Echo
A long echo effect.

Stereo Chorus
Simulates more than one instrument playing. Chorus can also be used to thicken the sound.

Stereo Flange
Flanging creates a sweeping jet-filter effect when used with harmonically-rich sounds such as string sections.

Phaser
Creates a swirly animation when used with harmonically-rich sound such as strings and can also be used to thicken-up a thin sound.

Effect A

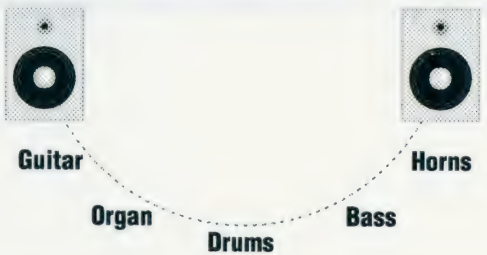
Effect A (Reverb) will probably be your main effect. Reverberation is such a great effect that you may be tempted to use it on everything. Often it is better to use reverb on some presets and not others to create a different sonic space for each sound. By varying the reverb amount, you can give each sound a slightly different feel. Sounds with little or no reverb tend to sound closer to the listener and have more definition.

Effect B

These effects can be used for accents, pseudo reverb (using delay) or for special effects. Instruments such as electric guitars, electric pianos and strings can benefit from tasteful amounts of chorus or flanging. Both effects can serve to fatten the sound and add animation to an otherwise static sound. String sections become lush pads using chorus. The phaser can be used on the drawbar organ preset to simulate its characteristic rotating speaker sound.

Panning

Panning is used to change the position of the sound between the stereo speakers just like the balance control on your home stereo. This allows you to shift the apparent position of a sound in the area in front of the listener. Panning each instrument to a slightly different position creates a realistic sound picture and helps impart a distinct identity to each sound.



Panning helps create a distinct identity for each sound.

Programming Effects

1) Select the type of Effect and the Routing: The effect type (Room, Hall, Chorus, etc.) and routing (Reverb, Chorus, Both or Pan) can be programmed from either the editor program or using a MIDI SysEx command.

2) Set the Effect Amount: The effect amounts for each are controlled by MIDI continuous controller messages from your sequencer. For example, controller message #91 sent on MIDI channel 1 will only control the reverb amount on that channel. The controller number must match the type of effect routing for the controller to have any effect. For example, trying to control the amount of reverb when you have chorus selected will not have any useful effect. The MIDI continuous controller numbers for the effect routings are shown below.

EFFECT ROUTING	CONTROLLER #	RANGE
Reverb Amount	91	0 to 14
Chorus Amount	93	0 to 14
Reverb & Chorus	91 or 93	0 to 14
Pan Position	10	-7 to +7

The Music Module has a total of 32 voice channels. However, some presets use 2 of these channels so the actual polyphony will vary according to which presets are in use. You should not ever run out of notes unless you are running a very complicated sequence. When more notes are played than the Music Module has channels, it *steals* one. MIDI channel numbers are used to determine the voice stealing algorithm. The percussion channel (#10) has the highest priority (the least chance of being stolen).

Channel Prioritization of the Music Module

10, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16

When sequencing, you should put your most important parts on lower numbered MIDI channels and less important parts on the higher numbered channels.

Expression Controller

MIDI Controller D has been programmed to control Expression. The Expression Control increases the volume of the particular MIDI channel by up to 6 dB and is used to bring up a solo or lead instrument from the rest of the "band". Continuous controller #11 is the standardized Expression Controller number. Expression control can be transmitted from your MIDI keyboard or sequencer.

MASTER/GLOBAL FUNCTIONS

Note

The Master/Global functions are accessed using the editor program supplied with the Music Module.

Master Tune

Master Tune adjusts the overall tuning of all presets so that the Music Module can be tuned to other instruments. The master tuning range is ± 1 semitone in 1/64th semitone increments. A master tune setting of "00" would indicate that the Music Module is perfectly tuned to concert pitch (A=440 Hz).

Transpose

This function transposes the key of the Music Module in semitone intervals. The transpose range is ± 12 semitones or one octave. The transpose function allows you to play in any key without transposing your playing.

Pitch Bend Range

When NOT in General MIDI mode, this function sets the range of your MIDI keyboard pitch wheel or lever in semitones. The maximum pitch bend range is ± 12 semitones. Set the range for the amount of pitch bend you prefer. The default pitch bend range is ±02 semitones.

Preset Change

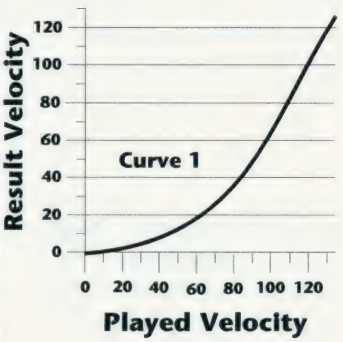
This function lets the Music Module utilize or ignore incoming MIDI preset change commands for each channel. Note that MIDI can only select presets 1-128.

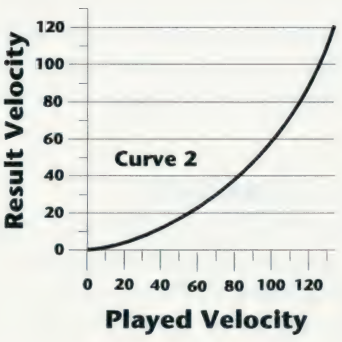
MIDI Enable

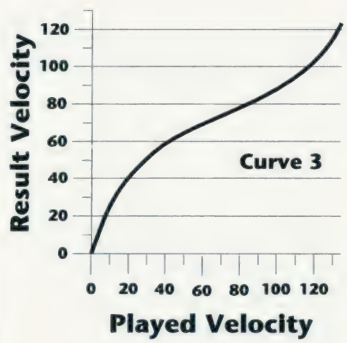
When in MIDI Multi mode, this function lets you turn each MIDI channel On or Off. This is useful when you have other MIDI devices connected and do not want the Music Module to respond to the MIDI channels reserved for the other devices.

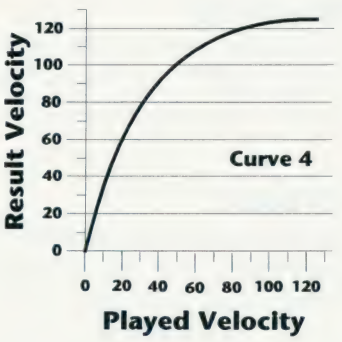
Velocity Curve

Incoming velocity data can be modified by a velocity curve in order to provide different types of dynamics in response to your playing or to better adapt to a specific MIDI controller. This function allows you to select one of the four velocity curves or leave the velocity data unaltered (Off).



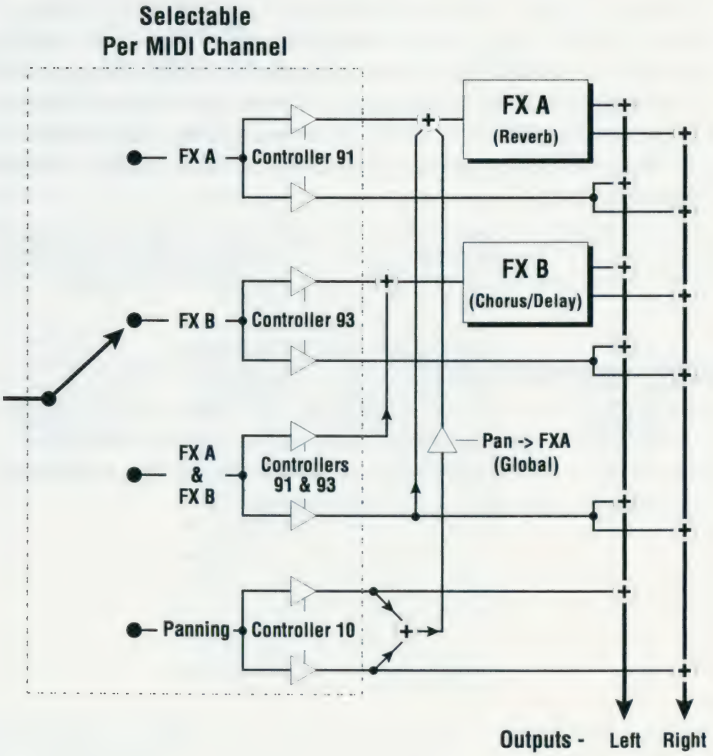






Effect Routing

This function allows you to select one of the four effects routings for each of the 16 MIDI channels. The Music Module contains two separate effects processors, FX A and FX B. Selecting FX A & FX B sends the preset on that MIDI channel through both processors. Selecting panning allows you to position the sound in the stereo field. An additional path, Pan -> FX A, allows a programmable amount of the panning signal to be sent through FX A so you can have panning as well as an effect. There is only one Pan -> FX A amount for the entire machine. The effects amounts and pan positions are controlled by sending a MIDI continuous controller value on the appropriate MIDI channel.



MIDI Overflow

When on, if you play more notes than the Music Module has channels (32), the additional note data will be directed out the MIDI Out port to a second Music Module in order to increase the polyphony to 64 channels. MIDI Overflow can be turned On or Off.

MIDI Controller Assign

The Music Module allows you to assign up to four realtime control sources from your MIDI controller. These control sources could be modulation wheels, data sliders or whatever. In this screen, you set up which controllers will be received by the Music Module. These should match the MIDI controller numbers output by your MIDI keyboard. What kind of effect the controllers will actually have is pre-programmed separately as part of each preset. The MIDI controllers are each assigned a letter, A-D. Each controller letter can be assigned to a MIDI realtime controller from 01-31.

Note: If controller numbers 7 or 10 are selected, they will override the standard MIDI volume and pan control routings.

MIDI Footswitch Assign

Like the MIDI Controllers, 3 MIDI footswitches can be assigned to MIDI footswitch numbers. Footswitches can be assigned numbers from 64-79. Destinations for the footswitch controllers are pre-programmed as part of each preset.

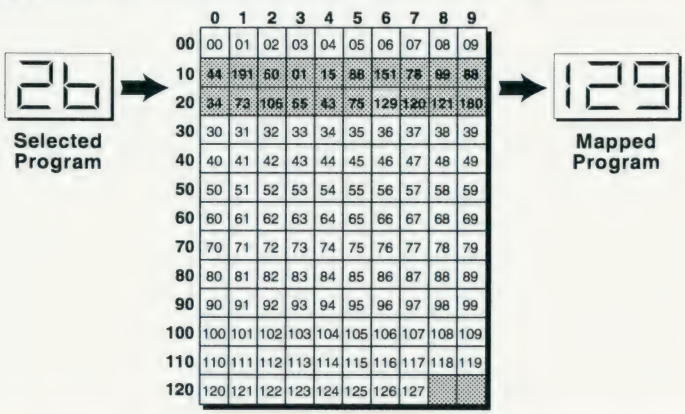
General MIDI On/Off

The Music Module can be switched OUT of General MIDI mode. **There are several differences in the Music Module when NOT in General MIDI mode.**

● Channel 10 is not reserved exclusively for drums. All 193 presets can be accessed and all can be used on channel 10.

● The General MIDI voice channel assignment which protects channel 10 and gives low numbered channels highest priority is replaced with a rotational algorithm. No MIDI channel has priority over any other.

● Presets are numbered from 000-192. Presets 128-192 can be accessed using a Program -> Preset Mapping function. Incoming MIDI program (preset) changes can be translated into a different numbered preset. Each of the 128 preset numbers can be programmed to call up any of the 192 presets in a Music Module bank. For example, the program -> preset map could be programmed so that selecting program 26 on your MIDI controller calls up preset 129 in the Music Module. Without preset mapping, preset 129 could not be accessed over MIDI.



	0	1	2	3	4	5	6	7	8	9
00	00	01	02	03	04	05	06	07	08	09
10	44	191	60	01	15	88	151	78	99	89
20	34	73	106	65	43	75	129	120	121	180
30	30	31	32	33	34	35	36	37	38	39
40	40	41	42	43	44	45	46	47	48	49
50	50	51	52	53	54	55	56	57	58	59
60	60	61	62	63	64	65	66	67	68	69
70	70	71	72	73	74	75	76	77	78	79
80	80	81	82	83	84	85	86	87	88	89
90	90	91	92	93	94	95	96	97	98	99
100	100	101	102	103	104	105	106	107	108	109
110	110	111	112	113	114	115	116	117	118	119
120	120	121	122	123	124	125	126	127		

This chart shows how MIDI preset changes can be re-mapped. In this example, program changes 10-29 have been re-mapped. All other programs will be selected normally.

ABOUT MIDI

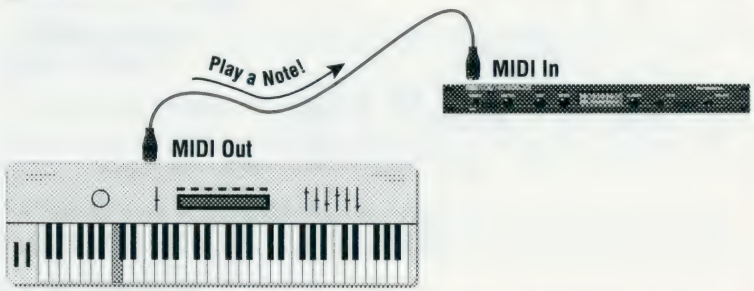
What it is

MIDI stands for Musical Instrument Digital Interface. MIDI is a worldwide standard interface which allows electronic musical instruments and computers to be connected together.

- MIDI cables and hardware are standardized so that equipment from different manufacturers will connect with a standard cable.

- The language that MIDI uses is standardized so that any MIDI instruments can communicate with each other.

At the most basic level, you can connect a MIDI keyboard to another MIDI instrument and be assured that the two will work together.

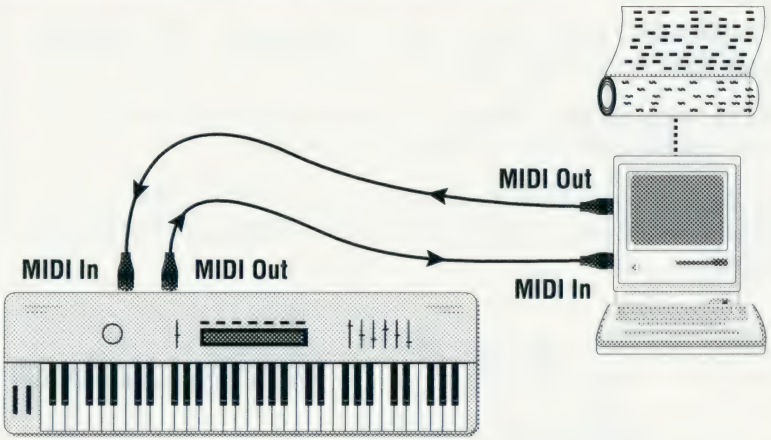


A simple MIDI setup where one MIDI instrument controls another.

The MIDI cable does not carry sound information. Instead it transmits digital information about which keys were pressed, how hard they were pressed, when a key is released, and so on. In other words MIDI consists of *Control Information*. The MIDI cable is unidirectional, meaning that data can only flow in one direction. In order for to instruments to talk back and forth, you would need two MIDI cables.

In the diagram above, the keyboard is the *MIDI Controller*. Other MIDI controllers include MIDI Guitar Controllers, MIDI Wind Controllers, and MIDI Drum Controllers.

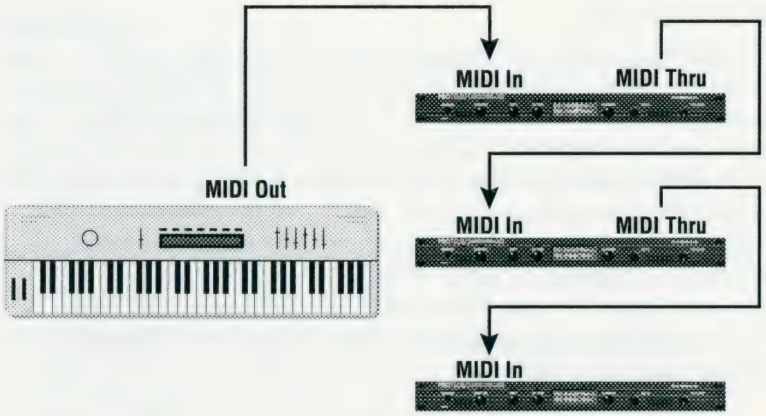
This digital information can be recorded into a computer and played back later. This is somewhat like a player piano and it's punched paper roll. The roll does not record the sound information, it just tells the piano which notes to play.



MIDI conveys control information about which notes were played. A computer can record this information and play it back like a player piano.

A device or a computer program that records sequences of Note On and Note Off messages is called *a Sequencer*. When you play the MIDI keyboard, it sends MIDI messages on its MIDI Out port to the computer sequencer, which records what keys were played and when they were played. When the sequence is played back, the computer sends the MIDI messages back to the keyboard which plays back the recorded performance.

Some MIDI devices have a third type of jack called *MIDI Thru*. MIDI Thru is simply a copy of the data from the MIDI In jack and allows you to connect several MIDI devices together in a daisy-chain arrangement.



MIDI Thru allows you to "daisy-chain" several MIDI instruments.

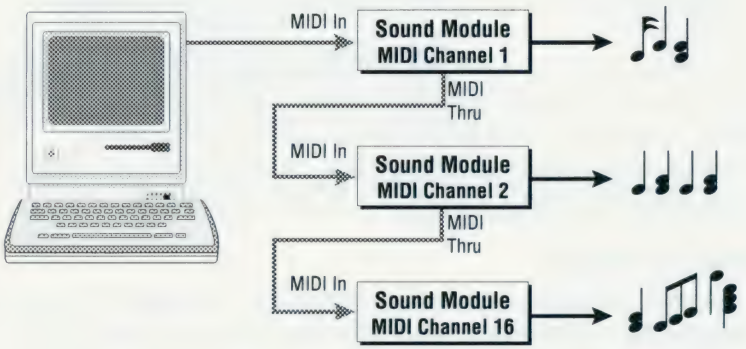
In addition to Note On and Note Off messages, *Velocity* information about how hard a key was pressed is also transmitted over MIDI . Almost all MIDI keyboards transmit velocity data. Velocity data is important in that it helps convey the emotion in the music. MIDI can recognize 127 different velocities

Program Change

Another important type of MIDI message is the *Program Change.* The program change command tells the sound generator which sound to play, whether it be a piano, a trumpet, a helicopter or whatever. Over MIDI you can select from a palette of 128 different programs (or sounds). Suppose we wanted to playback a sequence of piano music with a guitar sound? No problem. Simply send a program change message telling the General MIDI synthesizer or sound module to play program 25, which is a nylon string guitar. Want to hear the same song played with bird tweets? Send program change number 124. Since the note information is separated from the sound, it's easy to try out your music with different instruments.

MIDI Channels

So far we have been talking about just one sound at a time. However, using MIDI you can have up to 16 different instruments playing at one time. This is because there are MIDI provides 16 independent *Channels* of information for driving up to 16 synthesizers or other MIDI devices. A MIDI channel is rather like a channel on your TV set. If you tune in to one channel, you will not receive the other channels. The Music Module can receive on up to 16 MIDI channels simultaneously, which is like a TV with 16 screens! You can tune-in and listen to up to 16 different musical lines at once, selecting a different preset *(sound)* for each.



Each of the 16 MIDI channels can play a separate musical line using a different sound.

MIDI Modes

There are four basic MIDI modes which determine how a MIDI instrument (such as the Music Module) will respond to a channelized MIDI message.

- **Omni Mode** - The instrument will respond to any and all MIDI channels.
- **Poly Mode** - The instrument will respond polyphonically to the selected MIDI channel only.
- **Mono Mode** - The instrument will respond monophonically only to the selected MIDI channel. This mode is used mainly for MIDI guitar and wind controllers.
- **Multi Mode** - This mode is similar to Poly Mode, except that the instrument can respond to multiple MIDI channels. This mode is very important in a multi-timbral instrument such as the Music Module.

The Music Module incorporates all four MIDI modes.

Pitch Bend & Continuous Controllers

This is another type of MIDI message which is used to smoothly bend the pitch of a sound up or down (like a slide trombone). Most MIDI keyboards have a set of controls or wheels on the left side which are used for pitch bending and other functions. These controls can be wheels, knobs or levers. The pitch bend control is usually spring-loaded. The other control, traditionally called the modulation wheel or lever, is a general purpose control whose function can vary, depending on the sound module.

Pitch benders and modulation wheels come under a whole new category of MIDI messages called *Continuous Controllers*. Continuous controllers are normally used to add additional expression or control to your playing. These messages are channelized

so that each of the 16 MIDI channels has its own set of Continuous Controllers. The MIDI specification provides for no less than 121 controllers per channel!

Standardized MIDI Controller Numbers

1. Modulation Wheel or Lever
2. Breath Controller
3. Undefined
4. Foot Controller
5. Portamento Timne
6. Data Entry MSB
7. Main Volume
8. Balance
9. Undefined
10. Pan
11. Expression Controller
12. Effect Control 1
13. Effect Control 2

64. Sustain Pedal
65. Portamento On/Off
66. Sostenuto
67. Soft Pedal

91. Reverb Depth (FX A)
93. Chorus Depth (FX B)

Many of these controls have standardized numbers. For example, *Volume* is assigned to controller number 7 and Stereo position or *Pan* is assigned to number 10. The pedals of a piano are also represented by standardized continuous controllers: Sustain Pedal = 64, Sostenuto Pedal = 66, Soft Pedal = 67. The Music Module can respond to 49 of the available controller numbers.

System Messages

System messages include start/stop commands for starting sequencers and drum machines, MIDI clocks for synchronization. These messages are independent of channel assignments and act upon the entire system, hence their name.

System Exclusive

There is another category of MIDI system messages called *System Exclusive*. System Exclusive messages (or SysEx for short) are synthesizer-specific. In other words, each type of synthesizer or sound module has its own set of specialized messages. System Exclusive messages on the Music Module allow you or your computer to Remote Control every parameter on the Music Module. This is important, since the Music Module doesn't have many controls on its front panel. Thanks to SysEx and the Opcode Galaxy program, you can program literally hundreds of parameters on the Music Module if so desired. System Exclusive also allows you to transfer new sound programs into the Music Module. These sounds can either be purchased or of your own creation. Thus, you are NOT locked into a fixed set of sounds and you can customize the sounds to suit your own taste. The range of sounds is only limited by your imagination.

General MIDI

General MIDI is an optional set of guidelines which were developed to make MIDI even easier to use. General MIDI defines a minimum set of standards and regulate where sounds will be located within all General MIDI instruments. For instance, an acoustic grand piano will always be located at program #1; a nylon acoustic guitar will always be located at program #25, and so forth. Without General MIDI, sounds can be located wherever a particular manufacturer wants to put them. This can lead to confusion when trying to find a particualr sound.

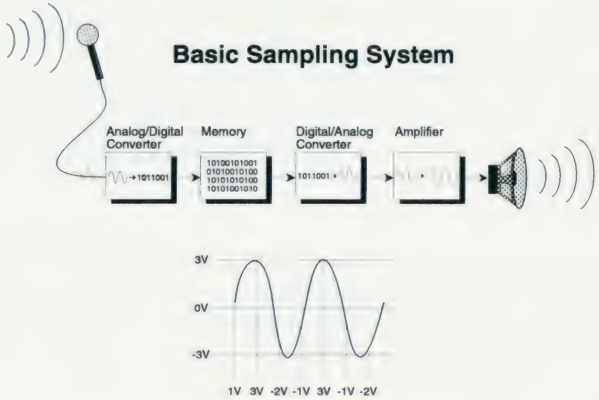
General MIDI also specifies that MIDI channel 10 will be used for percussion sounds only. It further specifies the keyboard locations of the various percussion instruments. General MIDI insures that sequences created on one synthesizer will play correctly on another.

About the Sounds

The SoundEngine Music Module utilizes digital recordings of real instruments for the basis of its sound. This is similar to a tape recorder except that in the Music Module, the sounds are permanently recorded on digital memory chips instead of tape.

To perform this modern miracle, sounds and instrument waveforms are first sampled (recorded) into the Emulator III, our top of the line, 16 bit stereo digital sampler. After the sounds have been truncated, looped and processed, they are "masked" into the Music Module ROM (Read Only Memory) chips.

Conceptually, the sampling process is very simple, as shown in the Basic Sampling System diagram. As a sound wave strikes the diaphragm of a microphone, a corresponding voltage is generated. To sample the sound, the voltage level is repeatedly measured at a very high rate and the voltage measurements are stored in memory. To play the sound back, the numbers are read back out of memory, converted back into voltages, then amplified and fed to a speaker which converts the voltage back into sound waves. Of course, playing back 32 channels at different pitches tends to complicate matters, but this is basically how it works. In the Music Module, we have left out the Analog/Digital converter stage since the sounds are already sampled for you.



GLOSSARY

Glossary

AHDSR
Abbreviation for Attack, Hold, Decay, Sustain, Release. These are basic parameters found on a synthesizer envelope generator. An envelope generator shapes various parameters of the sound over time, such as the volume or tonal content.

Aftertouch
The ability of an instrument to respond to pressure applied to keyboard after the initial depression of the key.

Amplifier
A device which increases the level of a signal.

Amplitude Modulation
A change in level of a signal. For example, if a volume of a signal is modulated in a cyclical fashion, the musical effect is known as Tremolo.

Analog
Data (signal) presented in non-digital, continuous form.

Attack
The beginning of a sound transient. Or, the rate at which a sound reaches its maximum initial volume.

Bit
A bit is a single piece of digital information assigned a value of 0 or 1 (off or on). Computers use words which are combinations of bits.

Bit Resolution
The number of bits used in a digital audio system (such as the Music Module). The higher the number of bits that are used, the greater the dynamic range of the system. The Music Module is a 16 bit system, which is the same as a Compact Disk.

Byte
A computer word made up of eight bits.

Cent
A unit of pitch equal to 1/100th of a semitone.

Channel, MIDI
An information pathway through which MIDI information is sent. MIDI provides for 16 available channels, each of which can address one MIDI instrument.

Chorus
A voice doubling effect created by layering two identical sounds with a slight delay (20-50mS) and slightly modulating the frequency of one or both of the sounds.

Continuous Controller Messages
A type of MIDI message used to add expression to a sound while it is playing.

Crossfade
To gradually fade out one sound while another sound fades in so that a seamless transition is made between the two sounds.

Cursor
A visual indicator showing the position of the next entry.

Data
Information a computer needs in order to make decisions or carry out a particular action. Sound data is the digital information that is used to re-create the sound.

Delay
A controllable time parameter giving the ability to start an event only after a predetermined amount of time.

Default
The setting that a device uses if none have been selected by the user.

Glossary

Digital
Equipment that uses quantities represented in binary (0 and 1) numbers.

Display
A device that conveys information in visual form.

Dynamic Range
The range of the softest to the loudest sound that can be produced by an instrument.

Edit
To change or modify information. To change parameters or modify existing information.

Envelope Generator
A device, usually triggered by pressing a key on a keyboard, that generates a programmable, changing curve with respect to time. The resulting envelope can be programmed to automatically change various parameters within the synthesizer.

Equal Temperament
A scaling system where the octave is divided into twelve equal parts. The ratio of frequencies between any two adjacent notes is exactly the same. Most keyboard instruments are scaled in this manner.

Equalization
A process by which various frequency ranges in the sound can be increased or decreased. Equalization can be used to make a sound more natural or to make it sound radically different.

Flange
An effect created by layering identical sounds with a slight delay (1-20mS) and mixing the two sounds back together causing a complex comb filtering effect.

Frequency
The number of cycles of a waveform occurring in a second.

Frequency Modulation
Abbreviated FM. The process of changing the pitch of a wave by another cyclic wave. If a low frequency is used to modulate the wave, the musical effect is called vibrato (as when a singer modulates his or her voice).

General MIDI
An optional set of guidelines for MIDI instruments which provides standards for compatibility between instruments. General MIDI specifies such things as the minimum number of voices, location of programs, percussion locations, etc. The idea being that music created on one MIDI instrument can be played back on another instrument even if it is made by a different manufacturer.

Ground Loop
A hum caused by currents circulating through the ground side of a piece of equipment or a system.

Hertz (Hz)
A unit of frequency equal to 1 cycle per second.

Interface
A device which allows two different pieces of equipment to interconnect. A MIDI interface allows musical instruments and computers to interconnect.

Keyboard Assignment
The assignment of specific sounds to an area of the keyboard.

Kilobyte
One thousand bytes of data. *(Actually 1024 bytes of data, but close enough to 1000.)*

Glossary

Layering
The ability to place two or more sounds on the same keyboard keys in order to create a thicker sound.

LFO
Abbreviation for Low Frequency Oscillator. An oscillator used for modulation whose frequency is below the audible range (20 Hz).

Line Output
A high level audio output such as the output from a CD player or tape recorder.

Loop
Looping is the process of repeating a portion of the sound over and over in order to create a sustaining sound. The looping will usually continue as long as the key is pressed.

Mapping, MIDI
The ability of a instrument to select a different, programmable program change message than the one received. For example, a MIDI mapper could be programmed to call up program 21 whenever program 01 was selected.

Megabyte
One million bytes. *(Well... actually 1,048,576 bytes of data, but close enough .)*

MIDI
Acronym for Musical Instrument Digital Interface. MIDI enables synthesizers, sequencers, computers, etc. to be connected together using a standard interface and language.

MIDI Channel
MIDI contains the provision for up to 16 channels which can each play a separate sound and musical line.

MIDI Interface
A device which allows multiple musical instruments or musical instruments and computers to interconnect.

MIDI Port
The hardware connector using a five-pin DIN type jack.

MIDI Software
A computer program which can record/play back, modify, or otherwise manipulate MIDI data.

MIDI Song File
A standard format for transferring MIDI song data between devices. Because it is a standard, songs can be played on different types of equipment.

Modulation
The process of one sound or control source influencing a parameter of a sound.

Multi-timbral
The ability of a musical instrument to produce two or more sounds or timbres at the same time.

Notation Software
A computer program which displays MIDI note messages in standard musical notation.

Pan
To move an audio signal from one output to another (left to right) in order to change the apparent position of the sound.

Patch
Refers to a particular sound created on a synthesizer.

Percussion Mapping
The keyboard positions of percussion sounds, where each key plays a different sound.

Glossary

Percussion Sound
Sounds of percussion instruments such as drums, cymbals wood blocks, etc.

Pitch Bend
A MIDI channel message which allows the pitch of a sound to be smoothly changed by the player.

Polyphony
The number of simultaneous notes that an instrument is able to play at once. The Music Module is 32 note polyphonic.

Port
The hardware connector through which digital data is transmitted or received.

Preset
A preprogrammed sound and control setup on an electronic musical instrument. Also called Programs in MIDI. Presets or programs can be made up in advance of a performance, stored in memory, then recalled instantly when desired.

Program Change Message
A MIDI channel message used to select different programs (presets).

Realtime
Occurring in actual time or live.

Reverb
Short for Reverberation. Reverb gives the effect of playing in various types of room such as in a cathedral, or large hall.

Sampling
The process of digitally recording a sound.

Sequencer
A device or software program which records and plays back performance data such as key presses, program changes, control

changes, etc. A sequencer works like a player piano in that the actions of the player are recorded, not the actual sounds.

Serial Interface
A computer interface in which data is passed over a single line, one bit at a time. MIDI uses a serial interface.

Software
The programs or sets of instructions describing the tasks to performed by a computer. A computer program

Synthesizer
A device which is capable of generating a variety of sounds.

Timbre
Tone color. The quality of a sound that distinguishes it from another sound with the same pitch.

Velocity
A MIDI parameter which describes how quickly a key was depressed.

Vibrato
A cyclic change in pitch, usually in the range of 7 to 14 Hz.

REFERENCE SECTION

Keyboards
1. Acoustic Grand Piano
2. Bright Acoustic Piano
3. Electric Grand Piano
4. Honky Tonk Piano
5. Electric Piano1
6. Electric Piano2
7. Harpsichord
8. Clavinet

Chromatic Percussion
9. Celesta
10. Glockenspiel
11. Music Box
12. Vibraphone
13. Marimba
14. Xylophone
15. Tubular Bells
16. Dulcimer

Organ
17. Drawbar Organ
18. Percussive Organ
19. Rock Organ
20. Church Organ
21. Reed Organ
22. Accordion
23. Harmonica
24. Tango Accordion

Guitar
25. Nylon String Guitar
26. Steel String Guitar
27. ElectricGuitar (Jazz)
28. Electric Guitar (Clean)
29. ElectricGuitar (Muted)
30. Overdrive Guitar
31. Distortion Guitar
32. Harmonics

Bass
33. Acoustic Bass
34. Electric Bass (finger)
35. Electric Bass (pick)
36. Fretless Bass
37. Slap Bass 1
38. Slap Bass 2
39. Synth Bass 1
40 Synth Bass 2

Strings
41. Violin
42. Viola
43. Cello
44. Contrabass
45. Tremolo
46. Pizzicato
47. Orchestral Harp
48. Timpani

Ensemble
49. String Ensemble 1
50. String Ensemble 2
51. Synth Strings 1
52. Synth Stings 2
53. Choir Aahs
54. Voice Oohs
55. Synth Voice
56. Orchestra Hit

Brass
57. Trumpet
58. Trombone
59. Tuba
60. Muted Trumpet
61. French Horn
62. Brass Section
63. Synthbrass 1
64. Synthbrass 2

Reeds
65. Soprano Sax
66. Alto Sax
67. Tenor Sax
68. Baritone Sax
69. Oboe
70. English Horn
71. Bassoon
72. Clarinet

Pipes
73. Piccolo
74. Flute
75. Recorder
76. Pan Flute
77. Blown Bottle
78. Shakuhachi
79. Whistle
80. Ocarina

Synth - Lead
81. Synth Lead 1 (square)
82. Synth Lead 2 (sawtooth)
83. Synth Lead 3 (calliope)
84. Synth Lead 4 (chiff)
85. Synth Lead 5 (charang)
86. Synth Lead 6 (voice)
87. Synth Lead 7 (fifths)
88. Synth Lead 8 (bass & lead)

Synth - Pad
89. Synth Pad 1 (new age)
90. Synth Pad 2 (warm)
91. Synth Pad 3 (polysynth)
92. Synth Pad 4 (choir)
93. Synth Pad 5 (bowed)
94. Synth Pad 6 (metallic)
95. Synth Pad 7 (halo)
96. Synth Pad 8 (sweep)

Synth - Effects
97. Synth FX 1 (rain)
98. Synth FX 2 (soundtrack)
99. Synth FX 3 (crystal)
100. Synth FX 4 (atmosphere)
101. Synth FX 5 (brightness)
102. Synth FX 6 (goblins)
103. Synth FX 7 (echoes)
104. Synth FX 8 (sci-fi)

Ethnic
105. Sitar
106. Banjo
107. Shamisen
108. Koto
109. Kalimba
110. Bagpipe
111. Fiddle
112. Shanai

Percussion
113. Tinkle Bell
114. Agogo
115. Steel Drums
116. Woodblock
117. Taiko Drum
118. Melodic Tom
119. Synth Drum
120. Reverse Cymbal

Sound Effects
121. Fret Noise
122. Breath Noise
123. Seashore
124. Bird Tweet
125. Telephone
126. Helicopter
127. Applause
128. Gunshot

Drum Sets
(MIDI Channel 10)

Banks A & B

1. STANDARD**
2. Standard Link
3. AMBIENT**
4. Ambient Link
5. SPATIAL KIT
6. STUDIO DRUMS
7. GATED**
8. Gated Link
9. ROOM**
10. Room Link
11. SLAPBACK SET
12. RADICAL KIT
13. MODERN
14. SPACE DRUMS
15. FLANGE KIT
16. REVERSE
17. POWER**
18. Power Link 1
19. Power Link 2
20. CHORUS DRUMS
21. FOLK KIT**
22. Folk Link
23. Electro Link 1
24. Electro Link 2
25. ELECTRONIC**
26. TR-808**
27. TR-808 Link
28. BOOMER DRUMS**
29. Boomer Link
30. ROCK DRUMS
31. BIG SET
32. TIGHT SET
33. JAZZ**
34. Jazz Link
35. LOUNGE SET
36. BIG BASS DRUM
37. STEREO KIT
38. PITCH DROP
39. PITCH RISE
40. mc-64/32*
41. BRUSH
42. MC-64 Link 2*
43. MC-64 Link 1*
44. Kicks**
45. Kick Link
46. Snares**
47. Snare Link 1
48. Snare Link 2
49. Orchestral**
50. Orchestra Link 1
51. Orchestra Link 2
52. STRONG SET
53. MUFFLED SET
54. PUNCHY KIT
55. DRY SET
56. MONDO KIT
57. Empty Preset
58. R & B KIT
59. CLUB SET
60. PICCOLO SET
61. Jingle Bells*
62. Bell tree A*
63. Bell tree B*
64. Heli Link*

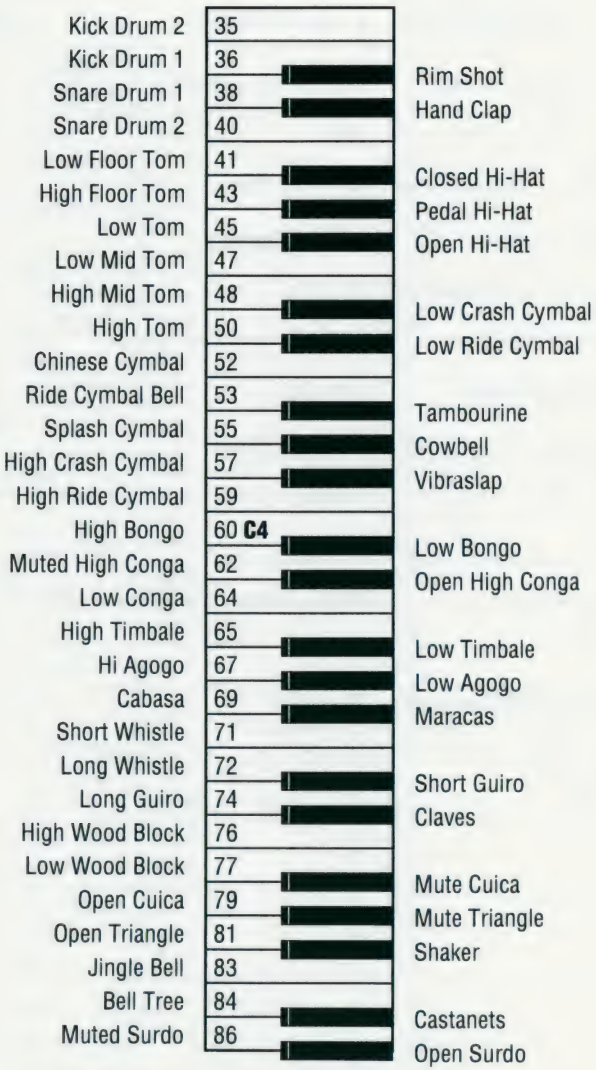
Kits in ALL CAPS

Alternate sets which are compatible with General MIDI sequences.

* *Indicates a linked preset.*

** *Linked to the following preset(s).*

General MIDI Standard Drum Sets



Specifications

Audio Channels:	32
Audio Outputs:	2
Max. Output Level:	+4 dB into 600Ω
Output Impedance:	1KΩ
MIDI:	In, Out, Thru
Data Encoding:	16 bit Linear
Sample Playback Rate:	39 kHz
Signal to Noise:	>90 dB
Dynamic Range:	>90 dB
Frequency Response:	20 Hz-15 kHz
THD +N:	<.05%
IMD:	<.05%
Stereo Phase:	Phase Coherent ±1° at 1 kHz
Power Requirements:	25 watts
Dimensions:	H: 1.5" W: 7.25" L: 9.5"
Weight:	2 lb, 12 oz (1.25 Kg)

MIDI Implementation Chart

Function...	Transmitted	Recognized	Remarks
Basic Default Channel Changed	No No	1 1-16	
Mode Default Messages	Yes	Mode 1, 3, 4 MONO, POLY OMNI, ON/OFF *	* Mode change is ignored in general MIDI mode.
Note Number True Voice	No No	0-127 0-127	
Velocity Note ON Note OFF	No No	Yes v=1-127 No	
After Keys Touch Channels	No No	Yes Yes	
Pitch Bender	No	Yes	
Control Change	No	Yes	0-31 64-79
Program Change True Number	No No	Yes 0-127 Yes 0-127	
All Sound Off	No	Yes	
All Notes Off	No	Yes	
Reset All Controllers	No	Yes	
System Exclusive	Yes	Yes	
System :Song Pos Common :Song Sel :Tune	No No No	No No No	
System :Clock Real Time :Commands	No No	No No	
Aux :Local On/Off Messages :Active Sense :Reset	No No No	No No No	

Notes: Pan 0=hard left 127=hard right

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO
Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO

MIDI Specifications

About this MIDI Specification

This section of the manual is included to provide a complete MIDI specification for programmers or MIDI power users. Most of the Music Module's sound programming functions are only accessible via MIDI SysEx. The Edit One program by Opcode allows access to all of the synthesizer parameters.

Dual MIDI Modes

The SoundEngine Music Module incorporates two MIDI modes which affect the way the Music Module responds to incoming MIDI messages.

Mode 1 - General MIDI Mode - F0 7E 00 09 01 F7

The Music Module responds according to the General MIDI spec. On power-up, this mode is automatically invoked and both banks of General MIDI presets are loaded into RAM. General MIDI mode has several features that differ from Non-General MIDI mode.

• Channel 10 is dedicated to drums. Incoming preset changes on channel 10 are automatically routed to percussion presets which are internally mapped at preset locations 129-192. Preset numbers greater than #63 will be ignored on channel 10.

• Voice channels are assigned to MIDI channels in the order: 10, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16. There are also default minimum voice channels assignments.

Channel 1:	8 minimum voice channels
Channels 2-3:	4 minimum voice channels
Channels 4-9:	2 minimum voice channels
Channel 10:	4 minimum voice channels
Channels 11-16:	0 minimum voice channels

These minimum channel numbers can be changed via System Exclusive command, however the sum of the minimum number of voice channels cannot exceed 32.

• Channel Volumes and Expression Controller. The Music Module powers up with all channel volumes set to 100 instead of the maximum of 127. This allows use of an expression controller (on continuous controller channel 11) to increase the volume of any given channel by up to 6dB.

Mode 2 - Proteus Mode - F0 7E 00 09 02 F7

In this mode, the Music Module behaves in a manner very similar to the Proteus line of sample players, with the addition of digital effects. (Proteus is E-mu's line of professional sound modules utilizing technology and architecture very similar to the Sound Engine Music Module.)

• MIDI channel 10 is NOT reserved for drums. It acts the same as any other MIDI channel.

• Voice channels are assigned in a circular order with a voice stealing algorithm based on the release of a voice channel's volume envelope. There is no feature to assign a minimum number of voice channels per MIDI channel.

• Channel volumes default to 127 on power-up. There is no expression controller.

• Presets range from 000-192. A Program->Preset mapping feature allows presets higher than 127 to be accessed over MIDI.

Received Channel Commands

Channels number (n) = 0-15. Message bytes are represented in hex. All other numbers are decimal. Running Status is supported.

Command	Message	Comments
Note Off	8n kk vv	rel. velocity ignored
Note On	9n kk vv	velocity 0 = note off
Key Aftertouch •	An kk vv	kk=0-127 vv=0-127
Program Change	Cn vv	0-127
Channel Aftertouch	Dn vv	0-127
Pitch Bend	En ll mm	l = lsb, m = msb
Realtime Controller	Bn cc vv	cc = 00-31
Footswitch	Bn cc vv	cc=64-79, vv≥64=on
Volume	Bn 07 vv	0-127
Pan	Bn 0A vv	0 = hard left, 127 = hard right
Effect A Amount	Bn 5B ee	ee = effect A amt.
Effect B Amount	Bn 5D ee	ee = effect B amt.
Reset All Controllers	Bn 79 00	ignored-omni mode
All Notes Off	Bn 7B 00	ignored-omni mode
Omni Mode Off * †	Bn 7C 00	**
Omni Mode On * †	Bn 7D 00	**
Mono Mode On * †	Bn 7E 00	**
Poly Mode On * †	Bn 7F 00	**

* *Proteus Mode Only* ** *forces all notes & controls off*

† *Special Notes: See following page*

† Special Notes in Proteus Mode (from previous page)

From Omni Mode	Omni Off turns Poly On.
From Poly Mode	Omni On turns Omni On; Mono On turns Mono On.
From Mono Mode	Mono Off turns Poly On; Omni On turns Omni On.
From Multi Mode	Omni On turns Omni On; Omni Off or Mono Off turns Poly On; Mono On turns Mono On.

All other changes have no effect.

General Information For Sound Engine Music Module SysEx

- Product ID for SoundEngine Music Module is **04**.
- Device ID is 00.
- Parameter Number and Parameter Value are 2 bytes each.
- Since MIDI data bytes cannot be greater than [7F] (127 decimal), the data values are "nibble-ized" to a 14-bit signed 2's complement format.
- There is only one edit buffer which is for the current preset (the preset shown in the display). Only one preset at a time can be edited via SysEx commands and changing the current preset erases the edit buffer.

MIDI SysEx Commands

For system exclusive commands, the following format is used:

F0	system exclusive status byte
18	E-mu ID byte
04	product ID byte
00	device ID byte
cc	command byte
...	data bytes
F7	EOX

SysEx Editing

Preset and setup parameters may be edited individually using system exclusive commands. The preset being edited is the active preset (the preset on the basic or global channel). The value of a given parameter may be changed by sending a *parameter value* command. The value of a parameter may be read by sending a *parameter value request*, to which the machine will respond by sending back the parameter value. Please note that there is only *one* edit buffer

Two MIDI bytes (lsb, msb) are required for each 14 bit data word. Bits 0-6 are sent first, followed by bits 7-13 in the next MIDI byte. All data words are signed 2's complement values with sign-extension out to the most significant bit (bit 13). This convention applies to all data words, regardless of the parameter's value range.

Preset data may also be transmitted or received in a single block (one complete preset) using system exclusive commands. A *preset data request* may be issued by a host computer, to which the machine will respond sending the data block for the requested preset. Conversely, the computer may send new preset data which will replace the specified preset.

The preset memory on the Music Module is **volatile**, meaning that any changes made to presets will be lost unless the data is saved to the host computer. The factory ROM presets are automatically downloaded into RAM on power-up.

The editor package supplied with the Music Module contains a full-featured librarian which makes it easy to build a custom library of sounds.

Warning: When transferring preset banks and tuning table data back and forth from the Music Module to a computer, the data should be recorded as you would a regular sequence. Sending the data in one huge chunk will clog the input buffer on the Music Module unless a time period of approximately 100 mS is inserted between each preset.

Received System Exclusive Commands

Command	Message	Comments
Preset Data Req.	F0 18 04 00 00 ll mm F7	*ll= preset # lsb* *mm = msb* *see note 6*
Preset Data	F0 18 04 00 01 ll mm ... cs F7	*cs=checksum*
Parameter Value Request	F0 18 04 00 02 pl pm F7	*pl = parameter # lsb pm = msb*
Parameter Value	F0 18 04 00 03 pl pm vl vm F7	*pl = parameter # lsb pm = msb* *vl = value lsb vm = msb*
Tuning Table Req.	F0 18 04 00 04 F7	*see note 7*
Tuning Table	F0 18 04 00 05 ... ... F7	*262 bytes*
Program Map Req.	F0 18 04 00 06 F7	*see note 8*
Program Map Data	F0 18 04 00 07 ... ... F7	*262 bytes*
Master Setting Req.	F0 18 04 00 08 F7	
Version Request	F0 18 04 00 0A F7	*see note 1*
Configuration Req.	F0 18 04 00 0C F7	*see note 2*
Instrument List Req.	F0 18 04 00 0E F7	*see note 3*
Preset List Request	F0 18 04 00 12 F7	*see note 4*
Master Volume Set	F0 18 04 00 14 vv F7	*vv = Vol 0-127*
Master Volume Req.	F0 18 04 00 16 F7	
Front Panel Request	F0 18 04 00 17 F7	*see note 9*

Received System Exclusive Commands

Command	Message	Comments
Switch Press	F0 18 04 00 19 0s F7	*see note 9*
Current Bank Req.	F0 18 04 00 1A F7	
Bank Select	F0 18 04 00 1B bb F7	*bb = 0 or 1*
Option Status	F0 18 04 00 1C oo F7	*see note 10* *oo = option #*
Set Option Status	F0 18 04 00 1D oo vv F7	*see note 10* *oo = option #; vv = status; 00 = Off, 01 = On*
Read Min Voices	F0 18 04 00 1E cc F7	*see note 10* *cc = MIDI chan 0-15*
Set Min Voices	F0 18 04 00 1F cc vv F7	*see note 10* *cc = MIDI chan 0-15; vv = min # of voices per channel*
Read Max Voices	F0 18 04 00 20 cc F7	*see note 10*
Set Max Voices	F0 18 04 00 21 cc vv F7	*see note 10*
Save Edit Buffer	F0 18 04 00 22 ll mm F7	*see note 11*
System Reset	F0 18 04 00 23 F7	*resets system to power-up condition*
General MIDI On	F0 7E 00 09 01 F7	*turns general MIDI On*
General MIDI Off	F0 7E 00 09 02 F7	*turns general MIDI Off*

Transmitted System Exclusive Commands

Command	Message	Comments
Preset Data	F0 18 04 00 01 ll mm ... ... cs F7	*ll= preset # lsb mm = msb cs = checksum*
Parameter Value	F0 18 04 00 03 pl pm vl vm F7	*pl = parameter # lsb pm = msb vl = value lsb vm = msb*
Tuning Table Data	F0 18 04 00 05 ... ... F7	*TT data = 256 bytes*
Program Map Data*	F0 18 04 00 07 ... ... F7	*see note 8*
Version Data	F0 18 04 00 0B 01 r1 r2 r3 F7	*see note 1*
Configuration Message	F0 18 04 00 0D pl pm s1 l1 m1 s2 l2 m2 F7	*see note 2*
Instrument List	F0 18 04 00 0F (14 bytes/instr.) ... F7	*see note 3*
Preset List	F0 18 04 00 13 (13 bytes/preset) F7	*see note 4*
Master Volume	F0 18 04 00 14 vv F7	vv = vol 0-127
Front Panel Data	F0 18 04 00 18 aa...aa cc ll F7	*see note 9*
Current Bank #	F0 18 04 00 1B bb F7	*bb = bank # 0 or 1*
Option Status	F0 18 04 00 1D oo vv F7	*see note 10*
Min Voices	F0 18 04 00 1F cc vv F7	*see note 10*
Max Voices	F0 18 04 00 21 cc vv F7	*see note 10*

** Proteus mode only*

• Note 1 - Version Request

This command allows identification of machine type and software revision. The Music Module will respond to the request with the version data:
F0 18 04 00 **0B** 01 r1 r2 r3 F7
r1, r2, r3 = software revision # in ascii (decimal point between r1 & r2).

• Note 2 - Configuration Message

This MIDI command is used to identify the sound sets in a given Music Module. The configuration request command is: F0 18 04 00 0C F7

The Music Module will respond to this command with the configuration message: F0 18 04 00 **0D** pl pm s1 l1 m1 s2 l2 m2 F7

where pl and pm are the lsb and msb of the total number of presets, s1 and s2 are the ID numbers of the sound sets contained in this unit, and n1=l1, m1 and n2=l2, m2 represent the lsb and msb of the number of instruments in each sound set. If no expansion set is present, s2 will be 7F and n2 will be zero.
Sound Engine General MIDI Sound Set = 5.

• Note 3 - Instrument List

This MIDI command allows external software to upload the instrument list as an array of ASCII strings. The instrument list request command is:

F0 18 04 00 **0E** F7

The Music Module will respond to this command with the instrument list message:

F0 18 04 00 **0F** (14 bytes per instrument) F7

The instruments are transmitted in the same order they appear to the user on the Music Module. Note that a given instrument's position in this list may be different from its actual number within the sound set.

instrument entry: il im (11 ascii bytes) 00

Each instrument entry in the list consists of the actual instrument number (as defined in "Sound Sets" - note 12) in lsb, msb format, followed by the instrument name (11 ascii characters plus a zero terminator) for a total of 14 (decimal) bytes. The first instrument is #1 as displayed on the Music Module. The total number of instrument names is equal to (n1+n2) in the configuration message above.

• Note 4 - Preset List

This MIDI command allows external software to upload all preset names as an array of ASCII strings. The preset list request command is:

F0 18 04 00 **12** F7

The Music Module will respond to this command with the preset list message:

F0 18 04 00 **13** (13 bytes per preset) F7

Each preset name is 12 ascii characters, plus a zero terminator, for a total of 13 (decimal) bytes. The first preset is #0. The total number of preset names is equal to pp in the configuration message above.

• Note 6 - Preset Data Request

Music Module presets are organized into ranges. Each range consists of 64 presets. The Music Module has three ranges of presets (0-191). Ranges may be requested using the preset request command and the appropriate preset code listed below. The two codes for ranges 0-63, 64-127 are functionally identical.

Preset Range	Preset Code	MIDI Message
0-63	1024	F0 18 04 00 00 00 08 F7
64-127	1025	F0 18 04 00 00 01 08 F7
128-191	1026	F0 18 04 00 00 02 08 F7
64-127	-1	F0 18 04 00 00 7F 7F F7
0-63	-2	F0 18 04 00 00 7E 7F F7

• Note 7 - Alternate Tuning

The "user tuning table" allows any key to be tuned to an arbitrary pitch over an 8 octave range. If selected in the preset, an alternate tuning may be achieved by modifying the tuning values from the front panel or downloading a new table into the machine. The table consists of 128 words, corresponding to the MIDI key range. Each word is a pitch value expressed in 1/64 semitones, offset from key number 0 (c-2). Therefore, for equal temperament, each entry in the table would be equal to its key number times 64.

• Note 8 - Program Mapping *(Proteus Mode only)*

MIDI program changes will normally correspond to internal preset numbers 0-127. However, the user may "re-map" any MIDI program number, assigning it to an arbitrary internal preset. This feature allows any of the internal presets to be selected from a MIDI keyboard controller.

• Note 9 - Front Panel Data

The front panel request uploads the ASCII text data that would normally be displayed on the LCD of a standard Proteus. The request message is: **F0 18 04 00 17 F7.**

The Sound Engine Music module responds with: **F0 18 04 00 18 aa...aa cc 0l F7.** Where **aa = 32 ASCII** bytes representing the text on the screen, starting in the top left hand corner of the LCD and moving to the bottom right. **cc = LCD cursor position** (0 to 1F, 0 = top left, 10 = bottom left, 1F = bottom right). If a cursor position is specified that exceeds 32, then the cursor will disappear from the screen. This condition is called "Cursor at Rest" and is used for a one way system dialog to the user.

0l = LED Status Bits (1 = on, 0 = off)
Bit 0: Master LED
Bit 1: Edit LED
Bit 2-3: Enter LED; 0 = off, 1 = on, 2 = flashing
Bit 4-7 Unused, always zero

Switch Press command is: **F0 18 04 00 19 0s F7**, where s is the switch number defined below.

0 Master switch press and release
1 Edit switch press and release
2 Enter switch press and release
3 Rotary Encoder decrement by one
4 Cursor switch press and release
5 Rotary Encoder increment by one

• Note 10 - User Definable Options

Several options can be enabled or disabled via SysEx messages. These options apply only to General MIDI mode. Upon exiting General MIDI mode options will be restored to default settings.

Read Option Status - Reports the status of the selected option.

Set Option Status - Turns the selected option Off or On.

Read Minimum Voices - Reads the current minimum number of voices for the designated MIDI channel.

Set Minimum Voices - Sets the minimum number of voices allocated to a given MIDI channel.

Read Maximum Voices - Reads the current maximum number of voices allocated to the designated channel.

Set Maximum Voices - Sets the maximum number of voices allocated to a given MIDI channel.

Option 0 - MPC Map (default on)
All incoming MIDI data on channels 13-16 is ignored. This option maintains compatibility with the MPC extended model.

Option 1 - MIDI Channel Prioritization (default on)
This option enables and disables the General MIDI channel prioritization and minimum/maximum polyphony scheme. The default minimums are: Channel 1:8, channels 2-3:4, channels 4-9:2, channel 10:4, channels 11-16:0. The default maximums are all 32, except for the percussion channel which defaults to 16. When Off, channel priority reverts to a circular assignment mode.

Option 2 - Exclusive Drums (default off)
Exclusive Drums prevents percussion and instrument parts from ever stealing voices from each other. This works by limiting the non-percussion polyphony to 32-n, where n is the maximum

polyphony assigned to the non-percussion channel. For example, if the maximum number of percussion voices is 8, there will be a maximum of 24 voices available for other instruments. When this option is selected, the individual maximum-voice settings for the non-percussion channels will not be in effect. Option 1 must be turned on for this option to have any effect.

Option 3 - Single Assign Drums (default off)
This option causes new notes on the percussion channel to mute any of the currently sounding voice channels having the same MIDI note number. Option 1 must be On for this option to have any effect.

Option 4 - Show Preset Plus One (default on)
Whenever a preset is displayed, an offset of one is added to the number. This means that the presets correspond to the General MIDI numbering scheme (1-128). With this option off, the numbering scheme becomes 0-127.

• Note 11 - Save Edit Buffer

The Save Edit Buffer command causes the contents of the edit buffer to be sent to the designated preset number.

Preset Data Format

Preset data is transmitted and received using the following format: The standard system exclusive header is followed by the preset number (lsb, msb), a 14 bit word for each preset parameter value (lsb, msb) starting at parameter #0 and continuing upward, a one-byte checksum, and the end-of-exclusive byte (F7). The checksum is the modulo 128 sum of all the parameter value bytes; that is, all of the data bytes following the preset number and before the checksum.

PRESET PARAMETERS

Parameter #	Parameter Name	Range
0-11	preset name (12 ascii characters)	32-127
12-14	preset link 1-3	0-191
15-18	preset, link 1-3 low key	0-127
19-22	preset, link 1-3 high key	0-127
23	pri instrument	0-255
24	pri sound start offset	0-127
25	pri tuning (coarse)	-36 to +36
26	pri tuning (fine)	-64 to +64
27	pri volume	0-127
28	pri pan	-7 to +7
29	pri delay	0-127
30	pri low key	0-127
31	pri high key	0-127
32	pri alt. volume attack	0-99
33	pri alt. volume hold	0-99
34	pri alt. volume decay	0-99
35	pri alt. volume sustain	0-99
36	pri alt. volume release	0-99
37	pri alt. volume envelope on	0-1
38	pri solo mode	0-1

PRESET PARAMETERS

Parameter #	Parameter Name	Range
39	pri chorus	0-15
40	pri reverse sound	0-1
41	sec instrument	0-255
42	sec sound start offset	0-127
43	sec tuning (coarse)	-36 to +36
44	sec tuning (fine)	-64 to +64
45	sec volume	0-127
46	sec pan	-7 to +7
47	sec delay	0-127
48	sec low key	0-127
49	sec high key	0-127
50	sec alt. volume attack	0-99
51	sec alt. volume hold	0-99
52	sec alt. volume decay	0-99
53	sec alt. volume sustain	0-99
54	sec alt. volume release	0-99
55	sec alt. volume envelope on	0-1
56	sec solo mode	0-1
57	sec chorus	0-15
58	sec reverse sound	0-1

PRESET PARAMETERS

Parameter #	Parameter Name	Range
59	crossfade mode	0-2
60	crossfade direction	0-1
61	crossfade balance	0-127
62	crossfade amount	0-255
63	switch point	0-127
64	LFO 1 shape	0-4
65	LFO 1 rate	0-127
66	LFO 1 delay	0-127
67	LFO 1 variation	0-127
68	LFO 1 amount	0-127
69	LFO 2 shape	0-4
70	LFO 2 rate	0-127
71	LFO 2 delay	0-127
72	LFO 2 variation	0-127
73	LFO 2 amount	0-127
74	aux. envelope delay	0-127
75	aux. envelope attack	0-99
76	aux. envelope hold	0-99
77	aux. envelope decay	0-99
78	aux. envelope sustain	0-99

PRESET PARAMETERS

Parameter #	Parameter Name	Range
79	aux. envelope release	0-99
80	aux. envelope amount	-128 to +127
81-86	key/vel source 1-6	0-1
87-92	key/vel dest 1-6	0-33 *see note 13*
93-98	key/vel amount 1-6	-128 to +127
99-106	realtime source 1-8	0-9
107-114	realtime dest 1-8	0-24 *see note 13*
115-117	footswitch dest 1-3	0-10
118-121	controller amount A-D	-128 to +127
122	pressure amount	0-127
123	pitch bend range	0-13
124	velocity curve	0-5
125	keyboard center	0-127
126	effect routing	0-3
127	keyboard tuning	0-5

GLOBAL/SETUP PARAMETERS

Parameter #	Parameter Name	Range
256	MIDI basic channel	0-15
257	MIDI volume (basic channel)	0-127
258 *	MIDI pan (basic channel)	-8 to +7

** A value of -8 = "P"*

The entire message to set pan to P = F0 18 04 00 03 02 02 78 7F F7

GLOBAL/SETUP PARAMETERS

Parameter #	Parameter Name	Range
259	current preset (basic channel)	0-383
260	master tune	-64 to +64
261	transpose	-12 to +12
262	global pitch bend range	0-12
263	global velocity curve	0-4
264	MIDI mode	0-3
265	MIDI overflow	0-1
266-269	controller A-D numbers	0-31
270-272	footswitch 1-3 numbers	0-15
273	mode change enable	0-1
274	device ID number	0-15
384-399	MIDI channel enable	0-1
400-415	MIDI program change enable	0-1
416-431	FX bus select	0-3
512-639	MIDI program/preset map	0-383
1459-1474	effect assign (Ch. 1-16)	0-3
1475	effect A type	0-19
1477-1486	effect A parameter values	0-100
1487	effect B type	0-5
1489-1498	effect B parameter values	0-100
1499	pan -> effect A amount	0-14

• Note 12- Sound Sets

A Music Module sound set consists of sample data (sound ROMs), plus additional instrument data in the program ROMs. Each sound set has a unique ID number. The sound set for the Music Module is #5.

It is necessary to include the sound set number as part of the instrument number when exchanging data. The complete instrument number contains two fields: bits 8-12 specify the sound set (0-31) and bits 0-7 specify the instrument within the sound set (0-255).

Instrument Bit Fields:

12 8 7 0

<— sound set —> <——— instrument # ———>

(5 bits) (8 bits)

Within any given sound set, the first instrument is #1 and #0 selects "None".

The "magic number" **1280** represents the start number for the standard Music Module instruments. To calculate the complete instrument number follow the instructions below. ,

SysEx Instr. No. = 1280 + Music Module Instr. No.

Next you must convert the SysEx Instr. No. to a 14-bit MIDI number. See the information on the following pages.

Example:
Suppose we want to change the instrument to I002 Piano Pad.

1) 1280 + 2 = **1282**

2) 1282 ÷ 128 = 10 r-2 = **10** (ignore remainder)

3) 10 in Hex = **0A** = msb

4) remainder 2 in Hex = **02** = lsb

5) SysEx Instrument Number =

lsb	msb
02	**0A**

The complete message to change the primary instrument to #02:
F0 18 04 00 03 17 00 02 0A F7

• 14-bit Signed 2's Complement Numbers

If the data value is negative, you must first take the 2's complement of the number: In the case of a 14-bit number this is equivalent to adding 16384 to the original negative value. To fit the 7 bit MIDI protocol, numbers must be "nibble-ized".

To get the 14-bit nibble-ized value (of a positive value or a 2's complemented negative value):

msb = value DIV 128 (divide and ignore the remainder)

lsb = value MOD 128 (divide and use only the remainder)

To go the other way (convert 14 bit signed 2's complement to a signed real number)

Raw Value = (msb*128) + lsb (gives you the unsigned raw value)

if Raw Value ≥ 8192 (8192 = 2^13)

then Signed Value = Raw Value - 16384 (16384 = 2^14)

Example: To find the "nibble-ized" Hex value of -127:

1) **-127 + 16384 = 16252**

2) **16252 ÷ 128 = 126 r-124**

3) **126 in Hex = 7E = msb**

4) **124 in Hex = 7C = lsb**

5) **Parameter value would be transmitted as 7C 7E**

Example: To find the "nibble-ized" Hex value of parameter #257:

1) **257 ÷ 128 = 2 r-1**

2) **2 in Hex = 02 = msb**

3) **1 in Hex = 01 = lsb**

4) **Parameter number would be transmitted as 01 02**

• Note 13 - Patchcord Destinations

The order in which patchcord destinations appear on the screen does not necessarily match the SysEx ordering.

KEY/VELOCITY CONTROLLERS

MIDI value	Destination
0	Off
1	Pitch
2	Primary Pitch
3	Secondary Pitch
4	Volume
5	Primary Volume
6	Secondary Volume
7	Attack
8	Primary Attack
9	Secondary Attack
10	Decay
11	Primary Decay
12	Secondary Decay
13	Release
14	Primary Release
15	Secondary Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Auxiliary Envelope Amount
22	Auxiliary Envelope Attack
23	Auxiliary Envelope Decay

KEY/VELOCITY CONTROLLERS

MIDI value	Destination
24	Auxiliary Envelope Release
25	Sound Start
26	Primary Sound Start
27	Secondary Sound Start
28	Pan
29	Primary Pan
30	Secondary Pan
31	Tone
32	Primary Tone
33	Secondary Tone

REALTIME CONTROLLERS

MIDI value	Destination
0	Off
1	Pitch
2	Primary Pitch
3	Secondary Pitch
4	Volume
5	Primary Volume
6	Secondary Volume
7	Attack
8	Primary Attack
9	Secondary Attack
10	Decay
11	Primary Decay

REALTIME CONTROLLERS

MIDI value	Destination
12	Sec. Decay
13	Release
14	Primary Release
15	Secondary Release
16	Crossfade
17	LFO 1 Amount
18	LFO 1 Rate
19	LFO 2 Amount
20	LFO 2 Rate
21	Auxiliary Envelope Amount
22	Auxiliary . Envelope Attack
23	Auxiliary . Envelope Decay
24	Auxiliary . Envelope Release

REALTIME CONTROLLERS

MIDI value	Source
0	Pitch Wheel
1	Controller A
2	Controller B
3	Controller C
4	Controller D
5	Key Aftertouch
6	Channel Aftertouch
7	LFO 1
8	LFO 2
9	Auxiliary Envelope

FOOTSWITCH CONTROLLERS

MIDI value	Destination
0	Off
1	Sustain
2	Primary Sustain
3	Secondary Sustain
4	Alternate Volume Envelope
5	Primary Alternate Volume Envelope
6	Secondary Alternate Volume Envelope
7	Alternate Volume Release
8	Primary Alternate Volume Release
9	Secondary Alternate Volume Release
10	Cross Switch

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